THE

Journal of Obstetrics & Gynaecology of the British Empire

VOL. 51, No. 6 NEW SERIES DECEMBER, 1944

Carcinoma of the Ovary*

BY

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TUMOURS arising in the ovary form a group with wide clinical and pathological variability, and extraordinary histological complexity. The range passes from a defined tumour of epidermal, mesodermal and endodermal structures with adult tissues to a complex histological picture, sometimes secreting chemical substances affecting other organs, and the body as a whole. Interest in the past has been focussed on the origin of these growths and their pathological classification, the clinician, however, is interested in their diagnosis, their treatment and the results of such treatment in each particular instance. Experience gained with 248 cases of malignant ovarian tumours in patients admitted to the Middlesex Hospital and the Mount Vernon Hospital, Northwood, has been analysed from this point of view and also to try and determine what X-ray therapy has achieved in their treatment. The number of cases recorded by individuals in the literature is small and satisfactory statistics are not available as in the case of carcinoma of the cervix.

PATHOLOGICAL CLASSIFICATION.

Histological classification of this series is difficult, as many were tabled simply as carcinoma or adenocarcinoma. The malignant cystadenoma was most frequent with the papillary cystadenoma next in order of frequency. Rare cases included the teratomata and the "seminoma" or dysgerminoma. As the number in each group is small, an attempt has not been made to outline prognosis for the separate histological entities.

DIAGNOSIS.

The signs of ovarian carcinoma are those of an ovarian tumour. In the advanced case clinical diagnosis is possible, in the early case clinical diagnosis may be suggestive of an ovarian carcinoma, but the only positive method of diagnosis is by exploratory laparotomy. There is nothing to guide the clinician in the statistics of in-

* Two hundred and twenty cases of malignant ovarian tumour admitted to the Middlesex Hospital and the Mount Vernon Hospital, Northwood.

cidence, age groups and symptomatology, while clinically benign tumours may undergo malignant change and conceal a small focus in a large primarily benign pathological condition. In the large majority the only sign is progressive enlargement of the lower abdomen, and this may be entirely symptomless. In others pressure on surrounding pelvic organs may produce symptoms referable to these. In rare cases dissemination may produce metastases and the patient first consults a doctor for these. In one of our cases the first symptom was a mass of glands in the left cervical region. The most important factor affecting prognosis is the anatomical extent of the disease at the time treatment is commenced. Regardless of histological type the following stages have been adopted in order to assess the results of treatment.

Stage 1. Unilateral tumour, completely removable, without visible metastases.

Stage 2. Bilateral tumours—both ovaries involved—with or without local pelvic metastases, but all completely removable.

Stage 3. Local pelvic metastases, only incompletely removable with the primary tumour.

Stage 4. Abdominal extension, carcinomatosis peritoneii or the presence of ascites in addition to the other stages.

The cases available for study number 248 and based on the above stages their occurrence in each group is as follows:

TABLE I.

1.	Unilateral	33 = 13.3 per cent
2.	Bilateral	26 = 10.4 ,,
3.	Pelvic metastases	33 = 13.3 ,,
4.	Abdominal extension:	
	Treatable	51 = 20.7 ,,
	Untreatable	70 = 28.2 ,,
	Recurrent cases	35 = 14.1 ,,

Considering the first three stages to be operable the operability-rate is 92 cases out of 213, or 43 per cent. Walter *et al.*[1] gives the operability-rate in 643 cases collected from the literature as 36.9 per cent.

Stage 4. Advanced Disease with Abdominal Extension.

Fifty-one patients with advanced disease are classed as treatable, because some treatment was given and some result was achieved.

TABLE II.

		Alive	Dead	Untraced
Operation only	1	—	—	1
Operation (removal) plus X-ray therapy ...	3	1 (16 years)	2 (1 operation death, 1 death 8/12)	–
Operation (incomplete removal plus X-rays) ...	11	5 (longest 5 years average 3½ yrs.)	6 (longest 8/12, average 4/12)	–
X-rays only (26 after laparotomy)	36	None	36(longest 34/12, average 7/12)	–
	51	6	44	1

One patient treated by laparotomy and X-rays was a young woman aged 26 years. A primary ovarian tumour was present with a metastasis in the omentum. The

primary and metastasis was removed. She was treated by radiotherapy. Ten years later a recurrent mass occurred in the omentum in the exact site of the previous metastasis. This was treated by X-ray therapy. Three years later a further mass appeared in the same site and this was removed. X-ray therapy was commenced but abandoned because of severe general symptoms. She is alive and well to-day with disease present 16 years after her first treatment. The growth was an adenocarcinoma. From this small series of cases it seems that surgery should be attempted in this group. Five out of 11 cases so treated are alive and well for an average of $3\frac{1}{2}$ years following treatment, the longest survival being 5 years, apart from the above case. X-ray therapy alone can also achieve worth while palliation. Out of 36 patients a number had between 2 and 3 years of symptom-free existence. The longest survival in the dead group was 34 months, compared with 16 months in 70 untreated cases, and the average 7 months.

Among 26 laparotomies 6 patients died following operation, an operative mortality of 23 per cent.

Metastatic Ovarian Carcinoma.

Thirty-five patients were admitted with metastases in treatable sites, the primary condition having been treated at some other hospital. The sites involved were:

Scar 4, pelvis 11, peritoneum and abdominal glands 16, not stated 4. The duration between operation and metastasis varied from 21 years to a few months. The 21-year patient, was operated upon in 1913 for an adenocarcinoma of the ovary. In 1934 she was admitted with a large mass in the pelvis clinically diagnosed as a recurrence of the ovarian carcinoma. Treated by X-ray therapy she responded well, and died 5 years later from disseminated disease. Thirty-three patients are dead and 2 are alive.

(1) Op. 1938. Recurrence scar and pelvis 1940. Deep X-ray therapy. Alive and free of clinical disease 1943. (3 years).

(2) Op. 1935. Recurrence in pelvis 1940. Deep X-ray therapy. Alive and free of clinical disease 1943. (3 years).

A further 70 patients were admitted with metastases, all of whom were untreatable. Five patients had received treatment previously for the primary condition, but 65 were first consultations. Most of them had a laparotomy and nothing further, and 3 patients died of the operation. The average duration of life in these 70 patients was 3 months, the longest survival being 16 months. In one patient the first complaint was of a mass of glands in the left cervical region, and one, with disseminated peritoneal deposits, was admitted as an emergency with a ruptured ovarian cyst. A third patient had complained of flatulence and indigestion for 2 years and was admitted with glands in the neck, axilla and lymphoedema of an arm. The lymph nodes were metastases from a primary ovarian carcinoma. Twenty-eight patients died within 1 month of admission. Apart from the usual sites of metastases, 2 patients had osteolytic deposits in the lumbar spine and pelvis.

Comment.

It seems that ovarian carcinoma may produce so little interference with normal health, symptoms being passed off as indigestion or flatulence, that extensive dissemination may occur and the disease reach a stage at which active treatment becomes impossible. Out of 220 cases, 68 of our patients were in this class. (29.5 per cent.) Apart from regular medical examination, this type of patient will always occur in practice.

Stage I. Unilateral Carcinoma of the Ovary.

(TABLE III).

Thirty-three patients received treatment.

Comment.

The prognosis of ovarian carcinoma is good when the disease is confined to one ovary and immediate surgical treatment is given. Although the number of cases is small the addition of post-operative X-ray therapy very slightly improves this survival.

Four unilateral cases were operated on later for carcinoma, either a second primary or a metastasis in the other ovary.

Case 1. Right ovary 1928. Left 1931. Died metastases 6 months later.

Case 2. Left ovary 1934. Right 1936. Died metastases 1 year later.

Case 3. Right ovary 1930. Left 1934. Died metastases in 8 months later.

Table III.

	No. of cases	Alive	Longest	Shortest	Average	Dead	Longest	Shortest	Average	Per cent Alive	Per cent Dead
Operation only ...	10	6	12 years	6 months	5 years	4	56 months	36 months	44 months	60	40
Operation and post-operative X-rays ...	21	13	14 years	3 years	6 years	8	62 months	6 months	25 months	64	36
Incomplete operation and post-operative X-rays	2	2	7 years	5 years	6½ years			——		100	0
X-rays alone ...	0		——					——		—	

Table IV.

	No. of cases	Alive	Longest	Shortest	Average	Dead	Longest	Shortest	Average	Alive Per cent	Dead Per cent
Operation	9	2	9 years	3 years	6 years	7	5 years	3 months	2 months	22	17
Operation plus X-rays	13	6	All over 3 years. (2 untraced since war).			7	7 months	1 month	4 months	46	54
Incomplete operation plus X-rays ...	4	0				4	4 years	7 months	18 months	0	100
X-rays alone	0	0				0				0	0

Table V.

	No. of cases	Alive	Longest	Shortest	Average	Dead	Longest	Shortest	Average	Alive Per cent	Dead Per cent
Operation only ...	6	0	—	—	—	6	14 months	1 months	7 months	0	100
Operation plus post-operative X-rays ...	24	7	8 years	5 years	5 years	17	4 years	2 months	12 months	29	71
X-rays alone	3	1	1 years			2	14 months	1 months	7 months.	—	

CASE 4. Right ovary 1930. Left 1930 (1 year later). Died metastases in 1 month.

The fact that these patients died within 1 year of the second operation from disseminated disease suggests that in all these cases the involvement of the second ovary was due to a metastasis.

STAGE 2. BILATERAL OVARIAN TUMOURS.

(*TABLE IV*).

COMMENT.

In all these cases the tumours were apparently confined to each ovary and local glandular or peritoneal metastases were not detected at operation. Operation was classified as incomplete when, owing to adhesion to intra-abdominal organs, the surgeon was convinced that tumour tissue was left behind.

Operation alone may result in long survival in these patients, but a greater number are salvaged if post-operative radiotherapy is given. The numbers are small but expressed as a percentage, almost double the number are alive and well at the end of 3 years. (In this table figures are only available over a period of 3 years for survivals. In all other tables 5-year survivals are expressed in the percentage figures). Operation was incomplete in 4 cases and none of these patients survived 5 years in spite of postoperative radiotherapy—although one patient survived 4 years after treatment.

STAGE 3. LOCAL PERITONEAL METASTASES INCOMPLETELY REMOVABLE.

(*TABLE V*).

There were 33 cases in this group.

COMMENT.

No patients in this group survived longer than 14 months when treated by operation alone. When post-operative X-radiation was given 7 out of 24 patients survived free of symptoms and clinical evidence of disease. All these patients have survived over 5 years and 2 of them over 8 years. In 9 of these the surgeon commented that he had removed all visible evidence of disease and 4 survived over 5 years (44 per cent). In the remaining 15 tumour masses were left in the pelvis and 3 of these (20 per cent) survived the 5-year period.

Classifying stages 1 and 2 as primarily operable the following results were obtained:

TABLE VI.

	No. of cases	Five-year survival	Percentage
Operation only ...	19	8	41
Operation plus X-ray therapy ...	40	21	52

For stages 1, 2 and 3 the following results were obtained:

TABLE VII.

	No. of cases	Five-year survival	Percentage
Operation only ...	25	8	32
Operation plus X-ray therapy ...	64	28	42·5

Given in absolute figures 143 patients were treated and the 5-year survival was 42 (29 per cent).

That the major factor in the prognosis of carcinoma of the ovary is the anatomical extent of the disease at the time of treatment is shown in the following table:

TABLE VIII.

	No. of cases	Five-year survival	Percentage
Stage 1 ...	33	21	63.6
Stage 2 ...	26	8	30.7
Stage 3 ...	33	7	21.2
Stage 4 ...	51	2 (3½ yrs.)	4

The growth is, however, symptomless in a large number of cases. Radiation therapy has a definite effect in increasing the numbers of survivals when surgery cannot cope with the disease. When the growth is still confined to the pelvis an increased depth dose of radiation may be obtained if the uterus is retained as a means of applying radium. This technique has been employed by Heyman[2, 3] in Stockholm and Ellis[4] in England, but sufficient time has not yet elapsed to evaluate the results of this method of treatment, in a large enough number of cases.

I wish to thank the members of the Honorary Gynaecological staff and the Radiotherapeutic Departments of the Middlesex and Mount Vernon Hospitals for allowing me to study the records of these patients, all of whom were under their care.

REFERENCES.

1. Walter, R. I., A. L. Bachman, and W. Harris. *Amer. Journ. Roent.*, 1941, xlv, 403.
2. Heyman, J. *Strahlentherapie*, 1930, xxxvii, 254.
3. Heyman, J. *Deutsche med. Wchnschr.*, 1932, lviii, 367.
4. Ellis, F. Personal Communication.

A Case Report of the Effect of Hysterectomy on Ovarian Activity in the Female Baboon

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IT has been reported that hysterectomy in women, before the age of 36 years, hastens the onset of the climacteric as assessed by the presence or absence of hot flushes. This occurs irrespective of whether one or both ovaries are left undisturbed.

In monkeys, whose cycles were followed for 121–217 days after hysterectomy, there was not any apparent disturbance of the menstrual rhythm as expressed by the cyclical changes in the vaginal contents. Burford and Diddle[1] and van Wagenen and Catchpole[2] both reported that there was not any experimental evidence to support the assumption that hysterectomy had any effect on the rhythmic activity of the ovaries.

Loeb[3] showed that if the uterus were removed after ovulation, the regression of the corpus luteum was inhibited. In the rabbit, hysterectomy appears to inhibit oestrus and leads to a reduction in the number of primary and secondary follicles in the ovary (Sessums and Murphy[4]). This regression could be prevented partially by the implantation of endometrium.

In women, the evidence to date seems to indicate that the integrity of the uterus is essential for normal ovarian activity, but in animals the results are not so consistent. The whole subject has been well reviewed by Reynolds.[5]

By observing over 4 years the perineum of a baboon after hysterectomy, however, not only were we able to ascertain that the function of the ovaries was impaired, but we obtained useful information as to the manner in which this impaired function manifested itself.

Although this study is based on observations made on a single animal only, the sequence of events which led to impaired ovarian function has been followed so carefully over this long period that no excuse is offered for placing on record the findings in this one case.

Hysterectomy was performed on this baboon in the stage of perineal turgescence. Eight days after hysterectomy, the perineum had undergone partial deturgescence and thereafter commenced to swell once more. This cycle was 81 days in length. Thereafter, the cycles were fairly regular and varied between 35 and 41 days in length (Fig. 1, A). One year after hysterectomy, the baboon was still going through regular cycles, but the size of the perineum at the height of turgescence was 6 inches less than the maximal height achieved immediately following hysterectomy (Fig. 1, B). The cycles then became very much longer and there was a dramatic decrease in their periodicity; some cycles extending over a period of 60 to 70 days. Further, at

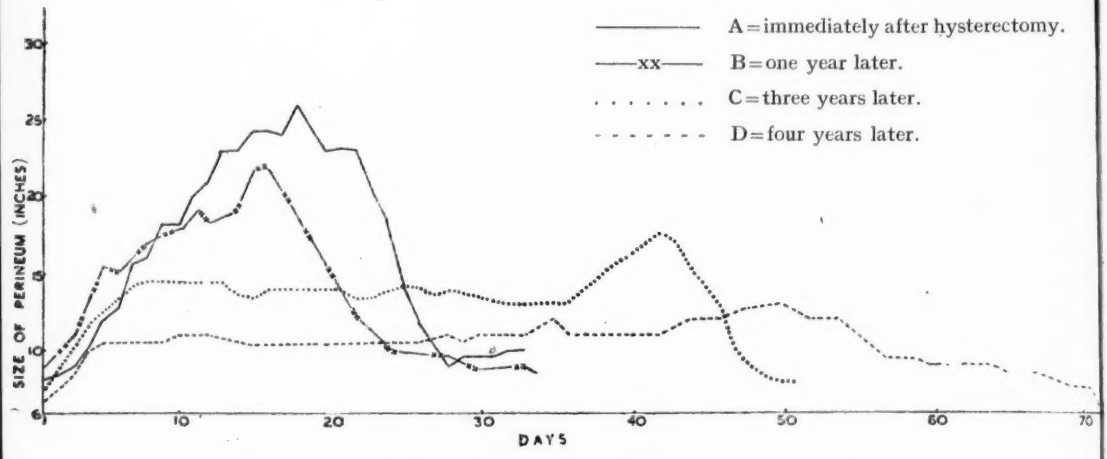

FIG. 1. The effect of hysterectomy on ovarian activity in the baboon.

the height of turgescence, the perineum was 11 inches below the maximal level recorded after hysterectomy (Compare Figs. 1, A, C). In the following year, it was difficult to recognize any obvious cyclical variations in the perineum. The maximal perineal measurement was now 16 inches less than that achieved previously and only 4 inches above resting level; the perineum was almost completely absorbed. It was maintained at the very much reduced size and then ultimately dropped to the resting level (Fig. 1, D). At this time, unfortunately, the animal died from a misadventure.

Despite the fact that the perineum seemed to indicate at first sight a profound reduction in the oestrogen output, the ovary did not appear to be atrophic to the extent that one would have expected from these perineal reactions. There was a considerable number of small follicles surrounded by several layers of granulosa cells; there were many large fluid-filled follicles, some of which were undergoing atresia. In addition there was ample evidence of the development of large follicular cysts and the healing of cysts as indicated by the presence of a peri-follicular fibrosis even up to the stage of scar formation. There was no indication of a recent or old corpus luteum.

COMMENT.

The record of the perineal swelling of this baboon after hysterectomy shows that at the end of 4 years the ovary had become physiologically impaired, although this could not be substantiated by a histological examination of the ovary. The earliest manifestations of altered ovarian activity is to be seen in the diminished turgescence attained during the menstrual cycle, while the menstrual rhythm is at first scarcely affected. In the 3rd year, however, the perineum becomes very much reduced in size and a menstrual rhythm scarcely exists.

Physiologically, the only interpretations which can be offered for this reaction in the perineum are that either the oestrogen output of the ovary becomes progressively reduced because perineal turgescence is dependent exclusively on the presence of an oestrogen (Gillman[6]), or else a progestogenic substance was elaborated elsewhere in this baboon to counteract the oestrogenic

effect on the perineum, for it has been established that progesterone and desoxycorticosterone acetate are capable of causing partial or complete deturgescence of the perineum in the presence of an oestrogen (Gillman[6], Gillman and Stein,[7] and Gilbert and Gillman[8]). No certain evidence could be found in the ovary of the production of a progestogen as no recent or old corpus luteum could be identified, nor had the thecal cells become enlarged in the atretic follicles.

The contradiction between the structural changes in the ovary and the perineal reactions is difficult to reconcile.

It is idle to speculate from this single instance as to the nature of the disturbance which rendered an ovary with such potentialities incapable of stimulating the same degree of perineal turgescence as was encountered in the 1st year after hysterectomy.

Sessums and Murphy[9] showed that despite the fact that one or both ovaries were left after hysterectomy in women, the climacteric hot flushes started, in some cases, 3 months after the operation and lasted for an average duration of 16 months. Moreover, these two investigators reported that the hot flushes last much longer when the ovaries are left undisturbed after hysterectomy than when they are removed.

It thus appears that the removal of the uterus affects ovarian activity much earlier in women than in the baboon. In the baboon, it has been shown that the size of the perineum attained during turgescence is gradually diminished over a period of time and only becomes much reduced 4 years after hysterectomy. Since apparently the climacteric symptoms continue for a longer period in hysterectomized women with intact ovaries than when the ovaries are removed, it would seem, on the basis of the findings in the baboon, that the persistence of the symptoms is dependent on the presence of at least some functional ovarian tissue.

In women, although the impairment of ovarian activity occurs rapidly after hysterectomy, nevertheless the nature of this altered ovarian activity simulates that which prevails in the baboon. From the case recorded here and from the work of Sessums and Murphy[9] in women, a normally functioning ovary is dependent upon the presence of at least a portion of the uterus.

The fact that a disturbance of the perineal rhythm after hysterectomy in the baboon can be recognized only at the end of the 2nd year is particularly important, as it might explain why it was that Burford and Diddle[1] and van Wagenen and Catchpole[2] were unable to discover any interference with ovarian activity in the *Macacus rhesus*, since their animals were observed only for a maximal period of 217 days after hysterectomy. Any investigation planned to discover the interrelation between the ovaries and the uterus in monkeys after hysterectomy can be satisfactorily achieved only by allowing a sufficiently long interval to elapse after the operation, as in the baboon it takes at least 3 years before the ovary shows unmistakable evidence of altered activity. It must be remembered, moreover, that, in the baboon, even when this impairment occurs, oestrogen is still produced and it is known that the presence of oestrogen affects the vaginal smear. In view of the fact that the periodicity of the cycles continues for at least 1 year after hysterectomy, the vaginal smear, therefore, is unsuitable as an indicator of that type of impaired ovarian function, such as occurs after hysterectomy.

Summary and Conclusions.

The reactions of the perineum of a mature baboon are described over a period of 4 years following hysterectomy.

It was shown that hysterectomy leads to reactions which could be interpreted as indicating altered ovarian function. This disturbance of ovarian function is very marked in the 4th year, despite the presence of seemingly normal ovarian tissue.

Comparison with the human female suggests that the impairment of ovarian function after hysterectomy is much more rapid in women than in the baboon.

It is suggested that the development and persistence of the hot flushes for prolonged periods after hysterectomy depend upon the presence of at least some functional ovarian tissue.

We wish to express our appreciation to Professor Raymond A. Dart for his interest and encouragement. This investigation was aided by a grant from the National Research Council and Board of the Union of South Africa to whom our thanks are due.

References.

1. Burford, T. H. and A. W. Diddle. *Surg., Gynecol. and Obstet.*, 1936, lxii, 701.
2. van Wagenen, G. and H. R. Catchpole. *Proc. Soc. Exper. Biol. and Med.*, 1941, xlvi, 580.
3. Loeb, L. *Amer. Journ. Physiol.*, 1927, lxxxiii, 202.
4. Sessums, J. V. and D. P. Murphy. *Surg., Gynecol. and Obstet.*, 1933, lvi, 600.
5. Reynolds, S. R. M. "Physiology of the Uterus," Paul B. Hoeber, New York, 1939.
6. Gillman, J. *Endocrinology*, 1940, xxvi, 1072.
7. Gillman, J. and H. B. Stein. *Endocrinology*, 1941, xxviii, 274.
8. Gilbert, C. and J. Gillman. In Press, 1943.
9. Sessums, J. V. and D. P. Murphy. *Surg., Gynecol. and Obstet.*, 1932, lv, 286 and 728.

Prophylactic Use of Pneumoperitoneum in the Puerperium of Tuberculous Patients

BY

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THE following is an account of the use of a pneumoperitoneum as a prophylactic measure in the treatment of the puerperium of 30 consecutive cases suffering from pulmonary tuberculosis.

Pulmonary tuberculosis in conjunction with pregnancy has long been the subject of anxious thought and speculation, and a vast literature has accumulated showing wide diversity of opinion with regard both to the danger of the combination and to the management of the condition.

Thus there was an era when, following the pronouncement of Hippocrates, pregnancy was regarded as being a valuable aid in the cure of phthisis. Later came a time when immediate abortion was advocated for the condition. Nowadays the usually accepted treatment is to induce an abortion up to 4 months, but to leave a more advanced pregnancy to proceed to term; the results of a late abortion being as serious as those of a pregnancy at term.

In the last 2 or 3 years, however, some women, particularly those with husbands abroad, or likely to be sent on active service, have rebelled against this practice of induction of an early abortion, and have refrained from attending either tuberculosis clinic or antenatal clinic until well into the 5th month of pregnancy, their abstention being due to the fear that they might be urged by their medical advisers to have the pregnancy terminated in the early months. Such women have presented an interesting problem during all periods of pregnancy.

Here it will not come amiss to examine a few statistics bearing on this subject.

1. *Chief Causes of Death in Women during Child-Bearing Age.*

Statistics for England and Wales[1] show that respiratory tuberculosis is the leading cause of death in the child-bearing age.

Ages	Respiratory tuberculosis	Cancer	Heart diseases
15—25	2547	124	588
25—35	2523	562	977
35—45	1533	2270	1748
15—45	6603	2956	3313

In America, Eisele-Mason[2] states that tuberculosis remains the leading cause of death in women of the child-bearing age.

2. *Incidence of Pulmonary Tuberculosis in Pregnancy.*

It is very difficult to obtain any authentic figures in regard to the incidence of tuberculosis in pregnant women. Browne[3] estimates the figure as being the same as that in the general population, and gives it as 1 in 200 or 0.5 per cent. Several of the American antenatal clinics (Allen and Bauer,[4] Royson, Jensen and Hauptmann,[5] Eisele-Mason[6]) give figures which vary between

0.07 per cent and 0.37 per cent, though Eisele-Mason,[7] by the use of fluoroscopic methods, later said that his own original estimate had to be raised by a further 1 per cent due to unsuspected but clinically important respiratory tuberculosis.

3. *Mortality from Tuberculosis in the Child-Bearing Age.*[8]

The death-rate in England and Wales in 1939 per 100,000 women was as follows:

Ages	Respiratory tuberculosis	All causes
15—20	61	164
20—25	97	227
25—35	72	247
35—45	46	251

4. *Mortality from Tuberculosis in Single and Married Women.*[9]

Separate death-rates for single and married women in England and Wales are not available after 1932, but the comparative mean annual rates per 100,000 living for 1930–32 are given below:

	Respiratory tuberculosis		All causes	
Ages	Single	Married	Single	Married
16—20	103	102	?	?
20—25	126	105	274	298
25—35	124	87	333	311
35—45	83	66	476	426

Edson,[10] in an examination of "the tuberculous mortality in New Zealand with special reference to the women of child-bearing age," gives the following figures:

Death-rate per 100,000 from respiratory tuberculosis.

	Single	Married
1926—29	70	51
1936—39	60	58

These figures are rather surprising, as one would have expected a higher mortality in the married women than in the single women. Various explanations may be offered to explain this lower mortality in the married women, such as (i) A marital selection—tuberculous women not marrying so freely. (ii) A possibly improved social and economic standing on marriage. (iii) Hormonal influence.

5. *Review of Some Published Works.*

Fossner[11] reported 185 cases of tuberculosis complicating pregnancy and found that 51 per cent were either made worse or had died; but in 359 non-pregnant women with tuberculosis he found that 52 per cent had either become worse or had died, and from these figures he concludes that the bad effect of tuberculosis on pregnancy is exaggerated, and he is against intervention.

Mariette, Larsen and Litzenberg[12] reported on 86 women, 18 to 39 years of age, treated in the maternity department of their Sanatorium and going to term. Of the 82 followed up, the mortality was 18.3 per cent in contrast to 39.1 per cent of the women of the same age group who were discharged from the Sanatorium for the first time during the same period. If those who had premature deliveries were also included, the mortality was 21.6 per cent as compared to 39.1 per cent. They say "there are many variables which will require further study before we can explain why the death-rate for all women 18 to 39 years of age following first discharge, is approximately twice that of the pregnant group."

Alice Hill[13] made a comparison of 160 women with their controls 1 year and 2 years after delivery, and so came to the conclusion that pregnancy has no appreciable bearing on the prognosis of the disease.

Castlen, Schultze-Rhonhoff and Han-

sen[14] hold that pregnancy has little effect on the disease, and that the prognosis depends on the type of pulmonary lesion, but that pregnancy imposes a severe strain on a sick woman.

Jameson[15] made a study of 451 married women between 20 and 35, and concluded that there is no significant difference in the death-rate from tuberculosis in the patients in whom the onset of the disease is related to a full-time or viable pregnancy as compared with that of a group of nulliparas of the same age group who show lesions of similar extent, and says that any attempt to evaluate the influence of the physiologic function of gestation, parturition and the puerperium on pulmonary tuberculosis which is not treated properly, must be considered of dubious value as similar experience with the untreated disease shows a high mortality itself.

Tisdall[16] emphasizes that the patients he studied were not sanatorium patients, and that in 53 per cent of the cases the disease did not manifest itself until term and the mortality was 47 per cent, and says that the main dictum in the case of these women is "treat the tuberculosis and disregard the pregnancy."

Kruase[17] in a review of the literature on the subject, severely criticized much of the published work, asserting that most of it "arises from fallacious premises with an almost complete lack of definition and limitation of terms," and says:

(a) "Even the woman herself has a quite clear appreciation of the antenatal period, the labour and the puerperium—each period having its distinctive function and exertion—but this is a fact that is not always appreciated by those who study her."

(b) "A certain percentage of women in normal health do not react sympathetically to pregnancy. Their whole constitution seems unfitted for the purpose, and pregnancy is to them a calamity with immediate and early breakdown in health. This type of woman will also react unfavourably to pregnancy when she has phthisis. On the other hand there are other women who improve in health with each pregnancy. Such a type of woman would most likely improve, although she had a chest lesion as well."

It is, however, frequently found that many women with pulmonary tuberculosis improve in health in the antenatal period, only to go downhill rapidly after delivery.

These variations in health in a pregnant woman with phthisis—the frequently improved health in the antenatal period—the deterioration in health in the puerperium—are usually explained as follows:

(i) That the improved health during the antenatal period is due to hormonal changes in the pregnant woman. Steinbach and Klein[18] state that the gonadotropic hormone (Antuitrin S, pregnant mare serum, and, to a lesser extent, Follutein) exerts a favourable influence on the progress of experimental tuberculosis in male and female rabbits and guinea pigs, and suggests that this may be an important factor in the economy of the pregnant tuberculous woman. This antenatal improvement has been noted frequently in primigravida and Brooks[19] suggests that it may be due to some desensitization of the lesion.

(ii) That in many cases in which women have weathered the antenatal period well, there is a severe breakdown in health immediately after labour, and on the 3rd or 4th day the temperature and pulse-rate rise, and the condition rapidly deteriorates. The cause of this breakdown may be due to the exertion of labour or to the altered position of the diaphragm previously "splinted" by the abdominal contents.

Rist and Jottras[20] claim that artificial pneumothorax protects the great majority

of these patients from this flare-up, and that the grave prognosis which must be given to a pregnancy occurring in active pulmonary tuberculosis has been modified by collapse of the diseased lung. They found that a better result was obtained in those patients in whom the lung was collapsed before pregnancy began than in those who were given an induction during pregnancy, and that the earlier the induction was given the better the result. They deduce from this that pregnancy has an adverse effect on the disease.

Baker and Ward[21] recommend a pneumothorax whenever possible in pulmonary tuberculosis and pregnancy, and describe cases in which they did a phrenic crush shortly before term, while Seeley[22] describes treatment of antenatal patients by rest and collapse therapy, including bilateral pneumothorax, thoracoplasty and phrenic nerve crush.

In certain cases it is inadvisable to bring about a collapse of the diseased lung either (a) because of adhesions, or (b) because the patient has been told that her lesion is cured.

Josephine Barnes[23] described a case in which adhesions prevented induction of a pneumothorax; she therefore produced an artificial pneumoperitoneum, and maintained it for about 4 weeks with satisfactory results.

Banyai,[24] Centoscudi,[25] Vajda[26] and Kugelmeier[27] have all used this treatment in pulmonary tuberculosis uncomplicated by pregnancy, while Vajda,[28] Zwirner[29] and Michelis[30] (who gives interesting photographs) have used it as treatment in the puerperium of patients with respiratory tuberculosis. Clifford-Jones and MacDonald[31] also describe its use, combined with a phrenic crush, in treatment of their patients.

Raymond Cohen[32] as a result of observation on 100 cases of parturition and pregnancy, found that 12 out of 100 retrogressed, and concludes that pregnancy and labour *per se* rarely exert harmful effect, that therapeutic abortion is unnecessary, and that active disease is seldom accelerated, and under favourable conditions pregnancy is but an incident in the disease.

6. *The Management of Pregnancy with Tuberculosis.*

It seems thus, from the study of the literature, that three important guiding principles emerge: (i) The patient must have adequate and appropriate treatment for her condition throughout the antenatal period. (ii) Labour must be as easy as possible to avoid over-ventilation of the diseased lungs. (iii) Some prophylactic treatment must be instituted to carry the patient over the dangerous first days of the puerperium.

Treatment of the Tuberculous Patient in this Clinic.

In the last 3 years 30 patients have been treated in this Clinic. They have presented themselves, and have given a history of chest trouble, or they have been specially sent by Tuberculosis Officers of the County. The total number passing through the Maternity Wards in this time is about 3,500, giving an incidence of about 0.85 per cent. This high figure is due to the fact that there is a Tuberculosis Unit in the hospital, and that Tuberculosis Officers are interested in the results of this treatment.

The treatment followed for clinic cases is as follows:

(*a*) *Antenatal Period.* The treatment throughout this period is arranged in consultation with the Tuberculosis Officer, Dr. Campbell, F.R.C.P. The patient is secured a sufficiency of rest, food, fresh air. This Hospital is fortunate in possessing several open-air wards and balconies for chest

cases, and the patients are admitted when necessary—sometimes weeks or months before term. Pneumothorax is used when indicated on the advice of the Tuberculosis Officer. Some patients are treated in their own District Tuberculosis and Antenatal Clinics before admission for delivery.

(*b*) *Labour*. The 1st stage of labour is made as comfortable and easy as possible by the use of suitable drugs. The 2nd stage is shortened and the strain reduced by making an episiotomy, or by the use of the forceps. In most cases, the infant was smaller than normal, and there was little delay in delivery. Low forceps were used three times, and labour was comparatively short and easy.

(*c*) *Puerperium*. A pneumoperitoneum is induced within 1 hour of delivery—3,000 c.c. of air or air-oxygen mixture are put in, and the amount added is gradually reduced during 1 month. The mother is on bed rest and does not breast-feed her infant, except in one or two instances.

(*d*) *Infants*. All but 2 infants were discharged alive and well. The majority of the children made slow progress for the first 2 or 3 weeks, and were put on the "danger list." A follow-up has shown that they are now healthy and are up to standard weight. In one case the mother had a positive Wassermann reaction and, despite all treatment, the infant died.

(3) *Method of Inducing the Pneumoperitoneum*. A Government Artificial Pneumothorax apparatus was used, and arranged so that the needle could be connected directly with the air bottles or with the pressure-gauge. Within an hour after delivery the abdominal wall just above and to the left of the umbilicus was infiltrated with 2 per cent Novocain. The needle was then inserted through the peritoneum, and 3,000 c.c. of air were slowly admitted into the abdominal cavity. The pressure was read, and the needle removed. One week later 2,000 c.c. were given, and one week later again 1,000 c.c. Each time the pressure was read. The abdomen remained tympanitic throughout the period, and for at least a week longer. In some cases more frequent refills were made as absorption seemed to be quicker, and in some a mixture of 1 part oxygen to 2 of air was used with satisfactory results.

The pressure in the abdominal cavity after inserting 3,000 c.c. of air was usually 10 cm. water, but this varied with the abdominal muscle. Usually there was a recovery of tone later, and the pressure in the abdomen was kept at 8–10 cm. with smaller amounts of air in successive weeks.

In the last 10 cases a mixture of air and oxygen in proportion of 2 : 1 has been used, and we think with benefit to the patient,

Thirty Consecutive Cases of Pulmonary Tuberculosis treated by Pneumoperitoneum.

The usual classification of pulmonary tuberculosis is given against each patient.

Class A. Sputum negative.

Class B. Sputum positive: (i) Good prognosis. (ii) Fair prognosis. (iii) Bad prognosis.

I. Positive Sputum—Bilateral Active Disease.

Patient A.A. Two gravida. Active disease in both upper lobes; affection of larynx; first seen at 18 to 20 weeks. Class Biii. Kept in open-air wards until term. Second stage of labour 10 minutes.

Puerperium. Temperature rising to 99°F. at nights, occasionally to 101°F. This higher temperature was usually checked by increasing the volume of the pneumoperitoneum (see temperature chart). After 6 weeks a left pneumothorax was induced, and 6 months after delivery she has been discharged to out-patients in category Bii.

Patient M.B. Two gravida. First seen 12 weeks. Complained of cough and "contact." X-ray showed extensive infiltration of right upper and middle lobes with cavities and small lesion in left

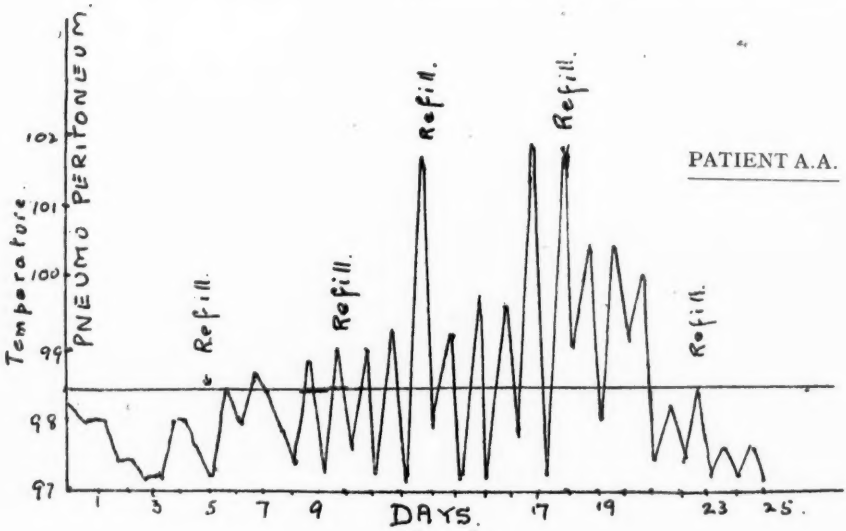

FIG. 1.

upper lobe. Right pneumothorax was induced immediately. Class Bii. Pneumoperitoneum induced after delivery.

Puerperium uneventful. Was in open-air ward during antenatal period. Sent to a sanatorium 6 weeks after delivery. Chest condition much improved. Lesion in left apex is much "harder," 6 months later.

Patient M.T. Three gravida. Class Biii. Extensive bilateral caseous disease, with cavities and laryngitis. History 5 years. Phrenic avulsion 2 years previously. First seen at 24 weeks. In open-air ward during antenatal period. Easy delivery.

Puerperium. Swinging temperature. Died 5 months later.

Patient M.W. Two gravida. Class Biii. Gross disease over whole of left lung. Active disease with cavitation in right upper lobe. Laryngitis. Swinging temperature. First seen at 30 weeks. Stillbirth at 33 weeks. Pneumoperitoneum induced. Condition still remains Biii. Prognosis changing to Bii.

Thus of 4 patients in this group, 2 had a hopeless prognosis, and of these, 1 has died, the other is still seriously ill. Two have greatly improved at the end of 6 months.

II. POSITIVE SPUTUM—UNILATERAL DISEASE.

(Four patients).

Patient R.A. Two gravida. Small lesion in right apex and middle zone. Group Bii. Previously had A.P. one year and sanatorium treatment. First seen at 37 weeks. Rested in open-air ward. Normal delivery. Second stage 50 minutes.

Puerperium. Apyrexial. Discharged at 1 month at own request to go later to a sanatorium. One year later still in sanatorium and making good progress.

Patient D.S.W. Two gravida. History 1 year. Class Bii. Haemoptysis. Lesion in left apex with left plueral effusion. First seen in this clinic at term. Second stage of labour 15 minutes. Postpartum haemorrhage. Blood transfusion 1 pint. Placental polyp removed on 10th day under pentothal. Discharged 10th week. Tuberculosis not found in samples of sputum. E.S.R. fell from 30 to 18. Six months later was well and weight was steady.

Patient F.N. (Plate I). Primigravida. Class Bii. Eight months' history. Active lesion in right lobe. Had refused to have pneumothorax induced in the early months. First seen at 36 weeks. Was in ward 1 month. Normal delivery with episiotomy.

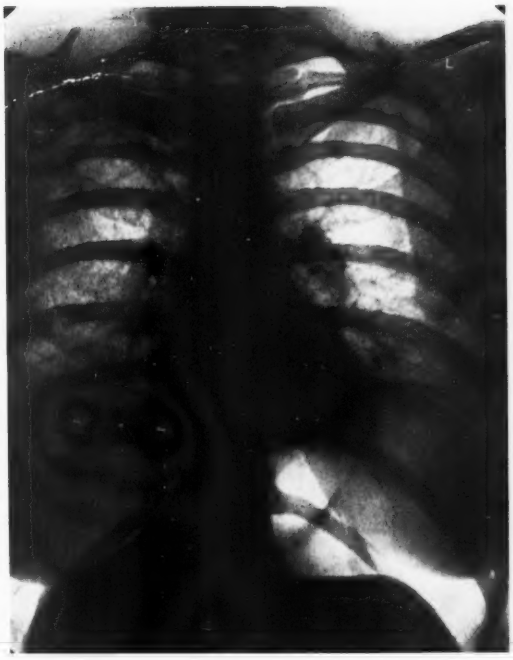

PLATE I.
Patient F.N.

P.D.

UNIV. OF MICH.

Second stage 1 hour. Took own discharge at 3 weeks. Entered sanatorium, but 6 weeks later developed an intractable diarrhoea, from which she died at home 4 months after delivery.

Patient V.D. Primigravida. Class Bi. Haemoptysis and positive sputum 10 months previously. First seen in labour. Second stage 15 minutes. Uneventful convalescence. Discharged at 10 weeks. No sputum. Condition satisfactory 7 months later.

Of these 4 patients, 1, who was non-co-operative, died; the other 3 are making satisfactory progress.

IV. Artificial Pneumothorax—Unilateral in all Cases. (Eight patients).

Patient I.W. (Fig. 2). Primigravida. Right pneumothorax: Two years pleural tuberculosis with effusion. Small lesion in left apex. First seen at 36 weeks in labour. Second stage 40 minutes.

Puerperium. Seventh day, patient complained of pain in chest and temperature rose to 101°F. Pneumoperitoneum was increased, and temperature fell (see chart). She was discharged after 3 weeks "very well." Eleven months later pneumothorax was slowly expanding and B.S.R. was "normal."

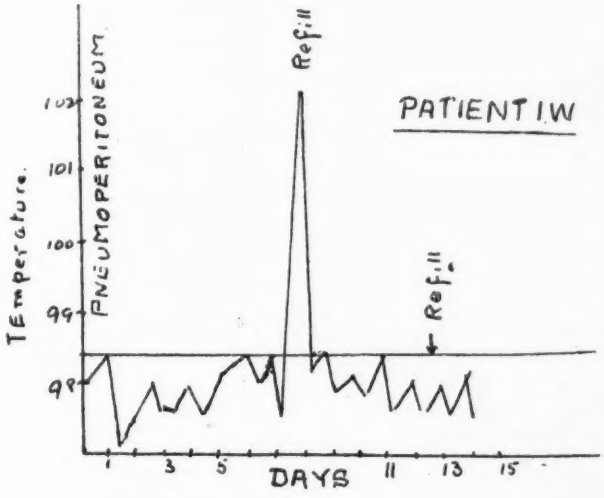

Fig. 2.

III. Active Disease—as Shown by X-Ray. No Sputum. (Two patients).

Patient D.S. Primigravida. Active lesion in right apex. Had been in a sanatorium 7 months. Total history 3 years. Normal labour.

Puerperium. Apyrexial. Discharged at 1 month. Six months later well and attending her own clinic.

Patient M.H. Early lesion in right apex. "Contact." Rested in ward 1 month before delivery. Has just been discharged after 2 months, and chest lesion shows signs of healing.

Patient G.H. Primigravida. Four years' history. Right pneumothorax in 1939. She let it lapse and it was again induced in 1940. It was kept up somewhat irregularly until she became pregnant in June 1942. There appeared to be some slight extension of the disease at the 5th month; after that she attended more regularly for refills, but refused sanatorium treatment. First seen in this clinic at 37 weeks in labour. Labour: face presentation. Second stage 65 minutes. Episiotomy. Discharged after 6 weeks. B.S.R. 6. Five months later in good health.

In October she again became pregnant, and has again passed satisfactorily through a pregnancy and has just been discharged. Her chest condition

does not show any deterioration, and her pneumothorax is very satisfactory. Her husband was killed a week before her baby was born.

Five other patients have had a normal antenatal period and delivery, apyrexial puerperium, and have been discharged in very good condition 3–6 months ago. All are still in good health.

One patient, M.W., was delivered 2 weeks ago, and is having a normal apyrexial puerperium, after a forceps delivery for a rather small pelvis, producing delay in the second stage.

All 7 patients who have been delivered have not shown any deterioration in the chest condition.

V. Thoracoplasty. (Two patients).

Patient L.B. Primigravida. History 7 years. Thoracoplasty after unsuccessful pneumothorax. Rested 2 weeks. B.S.R. 75. Labour 2 weeks premature. Normal delivery. Second stage 40 mins. Apyrexial puerperium. B.S.R. at 1 month 52. Very well 1 year and 18 months later.

Patient D.G. Primigravida. Thoracoplasty. 10 years previously. Second stage low forceps delivery under pentothal. Breast feeding successful. Three months later well and gaining weight.

VI. Pleurisy. (Two patients).

Patient E.W. Primigravida. Pleural effusion on right side to level of 3rd rib. Normal delivery. Air collected in left side of abdomen due to rigidity of right rectus muscle. Two short rises of temperature in puerperium. Well at 1 year and 2 years later.

Patient A.H. Primigravida. Pleurisy at left base. Normal labour and puerperium. Well after 6 months.

VII. Phrenic Crush or Avulsion. (Two patients).

Patient V.M. Primigravida. Left phrenic avulsion 6 years ago. Old fibrous tuberculosis in upper lobe. Left A.P. 6 months ago. Small congested active area in right mid-zone. Labour normal. *Puerperium.* Occasional rise in temperature to 99°F. Discharged at 1 month well, except for the fact that her E.S.R. remained at 38. Six months later she was reported well.

Patient H.L. Primigravida. Left phrenic crush 10 months previously. Sputum has been negative since then. Still in ward after quick labour lasting 3½ hours.

Puerperium for the first fortnight has been apyrexial.

VIII. Healed or Quiescent. (Six patients).

All patients remained well throughout antenatal periods and puerperium. One had a forceps delivery for delay in 2nd stage (longer than 1 hour). All started breast feeding, but in 3 cases the babies became critically ill about the 7th to 9th day. In 1 case the mother's milk was deep yellow and thick and creamy, and the baby vomited after every feed. After a stormy period it was discharged on the bottle, and has done well ever since. In 2 other cases the babies went down hill, had loose green stools with some vomiting, and after a time of great anxiety, were discharged bottle-fed.

Summary of Cases.

1. *Bilateral active disease*—positive sputum. 4 patients: 1 died, 1 very ill (both Biii). 2 improved (one Biii; other Bii).

2. *Unilateral disease*—positive sputum. 4 patients: 1 non-co-operative, died. 3 improving.

3. *Active disease*—no sputum. 2 cases: both improved after 6 months,

4. *Artificial pneumothorax.* 8 patients: 2 recently delivered. 6 satisfactory after 6 months.

5. *Thoracoplasty.* 2 patients: both satisfactory.

6. *Pleurisy.* 2 patients: both improved.

7. *Phrenic crush.* 2 patients: 1 satisfactory. 1 recently delivered.

8. *Quiescent or Healed.* 6 patients: all have done well.

One must ask—would these patients have made a satisfactory recovery without this treatment? One recalls two emergency admissions for puerperal pyrexia:

Mrs. J. Admitted with swinging temperature 1 month after delivery, having had a swinging temperature for 2 to 3 weeks—very flushed and toxic. No history of previous chest trouble. No pelvic or urinary cause was found for the temperature, but X-ray of chest showed extensive bilateral miliary tuberculosis. She died 2 weeks later.

Mrs. D., known to have a chest lesion. Admitted with swinging temperature 3 days after delivery. Severe laryngitis. X-ray of chest showed bilateral miliary tuberculosis. She was treated with a pneumoperitoneum, but died 5 months later suddenly from heart failure.

A general survey and examination of the cases shows that these patients who have been under observation in the antenatal period, in whom exertion in labour has been carefully limited, and who have received special puerperal care, have not been seriously affected by the pregnancy—except for patients W.T. and A.A., whose conditions appeared hopeless from the first, and patient F.N., who became worse one month later. That is, out of 30 cases, 2 were in the last stages of the disease from the first, but of the remainder only 1 retrogressed.

Induction of pneumoperitoneum is advocated as a prophylactic measure in the treatment of phthisical patients in the puerperium. It is simple to induce; the condition quickly subsides when required; patients who "know they are cured" submit to the treatment, usually without demur; it appears to be effective in preventing a rise of temperature in the first few days after labour.

Summary.

(1) An examination of statistics seems to show that the mortality from pulmonary tuberculosis in single women is somewhat higher than that in married women.

(2) A survey of the literature shows the importance attached to careful watching and treatment at all stages of pregnancy and the puerperium.

(3) A summary of the treatment in this clinic is given, with a description of the use of pneumoperitoneum as a prophylactic measure in the dangerous early days of the puerperium.

(4) A tabulated summary of lesions, treatment and progress of 30 patients is given with a few additional points of interest on some of the cases.

(5) Out of 30 patients, 25 have passed through labour and puerperium, and are doing well, and two are in the early puerperium.

References.

1. Registrar General's Statistics, 1939.
2. Eisele-Mason. *Amer. Journ. of Obstet. and Gynecol.*, 1938, xxxvi, 387.
3. Brown. "Brown's Antenatal and Postnatal Care."
4. Allen and Bauer. *Amer. Journ. Obstet. and Gynecol.*, 1936, xxxi, 885.
5. Royston, Jensen and Hauptmann. *Amer. Journ. Obstet. and Gynecol.*, 1937, xxxiv, 284.
6. Eisele-Mason. *Amer. Journ. Obstet. and Gynecol.*, 1938, xxxvi, 387.
7. Eisele-Mason. *Amer. Journ. Obstet. and Gynecol.*, 1942, xliv, 183.
8. Registrar General's Statistics, 1939.
9. Registrar General's Statistics, 1930–32.
10. Edson. *New Zealand Med. Journ.*, 1942, xli, 51.
11. Fossner. *Acta. Gynec. Scand.*, 1924, iii, 256.
12. Mariette, Larsen and Litzenberg. *Amer. Journ. Med. Sci.*, 1942, cciii, 866.
13. Alice Hill. *Amer. Rev. Tub.*, 1928, xvii, 113.
14. Castlen, Schultze-Rhonoff and Hansen. *Amer. Rev. Tub.*, 1936, xxxiv, 340.

14a. Schultze-Rhonoff and Hansen. *Ztschr. g. Gebruts und Gunak.*, 1929, xcvi, 17.

15. Jameson. *Amer. Journ. Obstet. and Gynecol.*, 1938, xxxvi, 59.
16. Tisdall. *Amer. Journ. Obstet. and Gynecol.*, 1938, xxxvi, 472.
17. Krause, A. K. *Amer. Rev. Tuberc.*, 1935, xxxi, 254.
18. Steinbach and Klein. *Journ. Exper. Med.*, 1937, lxv, 205.
19. Brooks. *Journ. Roy. Inst. Pub. Health*, 1940, iii, 67.
20. Rist and Jottras. *Bull. Acad. Med.*, 1935, cxiii, 610.
21. Baker and Ward. *New. Eng. Journ. of Med.*, 1942, ccxxvi, 224.
22. Seeley *et al. Amer. Journ. Obstet. and Gynecol.*, 1939, xxxvii, 741; 1940, xxxix, 51.
23. Josephine Barnes. *Lancet*, 1939, ii, 976.
24. Banyai. *Amer. Journ. Med. Sci.*, 1931, clxxxii, 352.
25. Centoscudi. *Rev. Pat. clin. Tuberc.*, 1936, x, 22.
26. Vajda. *Z. Tuberk.*, 1933, lxvii, 371.
27. Kugelmeier. *Beitr. Klin. Tuberk.*, 1935, lxxxvii, 262.
28. Vajda. *Zeitschr. f. Tuberk.*, 1939, lxxix, 27.
29. Zwirner. *Beit. z. Klin. Tuberk.*, 1938, xci, 438.
30. Michelis. *Minerva. Med.*, 1937, xxviii, 183.
31. Clifford-Jones and MacDonald. *Tubercle*, June 1943.
32. Cohen, R. *Brit. Med. Journ.*, 18th December, 1943.

Report on 130 Consecutive Cases of Placenta Praevia without Maternal Death

BY

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PLACENTA praevia occurs as a complication in about 1 to 2 per cent of all deliveries. That it is a serious complication is shown by the mortality rate, which varies from 2 to 8 per cent.

Recently the mortality rate has dropped for two reasons, *viz.*, (1) the increased use of blood transfusion, and (2) increased use of Caesarean section.

At the Baltimore Hospital in New York the death-rate from placenta praevia was, in 1922, 32 (11.5 per cent), in 1932 it was 38 (2 per cent). This drop was credited to the increase in the number of blood transfusions.

Arnell and Guerriero[1] reported a maternal death-rate 5 times greater after delivery by the vaginal route than after the abdominal route.

Siegel,[2] in 332 consecutive cases, reports a maternal mortality of 6.6 per cent in vaginal and 1.9 per cent in abdominal deliveries. The foetal mortality was 48.8 per cent in vaginal and 27.8 per cent in Caesarean deliveries.

Mahfouz and Magdi[3] report 314 cases in 18,467 deliveries, or 1.7 per cent. These comprised 19.7 per cent central, 58.7 per cent marginal, and 21.6 per cent lateral. The maternal death-rate was 6.1 per cent, and the foetal 49 per cent.

Marr[4] reported 146 cases. Forty of these were treated by Caesarean section, with a mortality of 2.5 per cent, and 106 by vaginal delivery, with a mortality of 5.6 per cent.

Binder[5] reported 84 cases in 9,000 deliveries, with a maternal mortality of 2.4 per cent and a foetal mortality of 6.0 per cent.

Greenhill[6] reported 118 cases, 42 of which were treated by Caesarean section without a death, and 76 by the vaginal route, with a 4 per cent mortality.

Wilson[7] reported 102 cases; 32 had Caesarean section, without a death, and 70 had vaginal deliveries, with a mortality of 4.3 per cent.

Berkeley[8] collected a series of 4,580 cases, of which 1,911 were treated by methods now in use, with the following results:

502 Caesarean sections, 21 deaths. Foetal 15 per cent.

571 bi-polar version, 30 deaths. Foetal 85 per cent.

391 scalp traction, 4 deaths.

391 rupture of membranes, 5 deaths.

Munro-Kerr[9] published the results from 5 of the large maternity hospitals in the British Isles. In a total of 1,083 cases the death-rate was 8.4 per cent. Divided into booked and emergency groups, the death-rates respectively were 3.1 per cent and 10.1 per cent. He compares these results with those of the Rotunda Hospital from 1927 to 1931, where, out of a total of 102 cases, there were 2 deaths, or 1.9 per cent. The difference between these two sets of figures he attributes to the system of staffing at the Rotunda Hospital.

The only published series of cases which corresponds with this report, is that of Daily,[10] from the Chicago Lying-in Hospital. He reports 139 cases without maternal mortality, and with 22 per cent foetal deaths. He stresses the use of blood transfusions, and of examination under anaesthetic in all suspected cases. The treatment in this series was as follows:

Caesarean section	58 cases
Rupture of membranes	25 ,,
Version	18 ,,
Bags	12 ,,
Porro operation	6 ,,

My series now reported occurred between 1937 and 1944 in a total of 8,000 deliveries.

The 130 cases of placenta praevia were in the following proportion:

Central	32
Marginal	46
Lateral	52

There was no maternal mortality.

Of the 133 infants born (3 sets of twins) 114, or 86 per cent, were born alive, 19, or 14 per cent, were stillborn, and 28, or 22 per cent, died. Thirty of the cases occurred in primiparae and 100 in multiparae. Eighty-three of the cases were emergencies, the remaining 47 occurring among clinic cases. Methods of treatment depended on the type of placenta praevia, and on the condition of the mother on admission. All patients were delivered as soon as possible after diagnosis had been made, with the exception of a few cases in which the baby was barely viable, and in which the mother agreed to stay in hospital under observation the whole time.

Treatment for the different types was as follows:

Central placenta praevia. (32 cases.)

Caesarean section	30
Application of Willett's forceps	1
Manual removal of placenta before delivery of the infant in a case when the patient was admitted fully dilated	1

Marginal placenta praevia. (46 cases.)

Caesarean section	15
Application of Willett's forceps	19
Plugging with the half-breech	3
Artificial rupture of membranes	4
Manual delivery	1
Normal delivery	4

Lateral placenta praevia. (52 cases.)

Caesarean section	2
Application of Willett's forceps	16
Artificial rupture of membranes	16
Normal delivery	18

Blood transfusions were required in 16 cases.

Puerperal pyrexia occurred in 7 cases—all following Caesarean sections—but all were mild and lasted only for about 3 days. Two of these cases were due to acute tonsillitis and 1 to pneumonia occurring before delivery. There was 1 case of paralytic ileus.

Of the 19 stillbirths, all were due to extensive separation of the placenta excepting 1, when the mother was seriously ill with pneumonia—the baby died before the onset of labour. Postmortem examinations were performed on 18 of the 28 cases of neonatal death, the causes of which were:

Prematurity	20
Congenital atelectasis	4
Cerebral haemorrhage	1
Congenital defects	3

Summary.

A series of 130 consecutive cases of placenta praevia is reported, without maternal death, and with a stillbirth rate of only 14 per cent.

New methods of treatment have not been used, and the results are probably due to increased use of Caesarean section and blood transfusion, to early diagnosis, and to the fact that all patients are seen immediately on admission by a senior obstetrician.

My thanks are due to my colleague, Dr. Noel Gosse, who assisted in the treatment of this series from 1940 to 1943.

REFERENCES.

1. Arnell, R. E. and W. F. Guerriero. *Amer. Journ. Obstet. and Gynecol.*, 1940, xxxix, 32.
2. Siegel, I. A. *Amer. Journ. Obstet. and Gynecol.*, 1940, xxxix, 301.
3. Mahfouz, N. P. and I. Magdi. *Journ. Obstet. and Gynaecol. Brit. Emp.*, 1939, xlvi, 941.
4. Marr, J. P. *Amer. Journ. Obstet. and Gynecol.*, 1935, xxix, 454.
5. Binder, J. *Amer. Journ. Obstet. and Gynecol.*, 1934, xxviii, 92.
6. Greenhill, J. P. *Surg., Gynecol. and Obstet.*, 1930, l, 113.
7. Wilson, R. A. *Amer. Journ. Obstet. and Gynecol.*, 1934, xxvii, 713.
8. Berkeley, C. *Journ. Obstet. and Gynaecol. Brit. Emp.*, 1936, xliii, 393.
9. Kerr, J. M. Munro. "Maternal Mortality and Morbidity," 1933. Edinburgh: Livingstone, p. 123.
10. Daily, E. F. *Surg., Gynecol. and Obstet.*, 1934, lix, 106.

Choledochus Cyst Complicating Pregnancy and the Puerperium

BY

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CHOLEDOCHUS cyst complicating pregnancy and the puerperium is an association of great rarity. The importance of its recognition lies in the prolonged morbidity and the inevitably fatal termination of the inadequately treated case.

AETIOLOGY OF CHOLEDOCHUS CYST.

Though this condition is more common in females, for of the 150 or so cases reported up to the present time 80 per cent occurred in that sex, the rarity of its association with pregnancy is probably due to the early age at which symptoms present, and hence treatment is sought. The average age is 11 years for males and 10 years for females, in fact 40 per cent of the patients first present themselves for treatment under the age of 10, 30 per cent between 11 and 20, 25 per cent between 21 and 30, and only occasionally over the age of 40 years. The oldest recorded case, untreated, is that of a woman of 56 years, but she knew that she had had a large tumour for 20 years (Reel and Burrell[1]).

An hereditary tendency has not been proved to exist, but the condition has been described in the foetus (Heiliger[2]), and it is usually looked upon as a congenital abnormality.

The biliary passages are developed from an outgrowth on the ventral aspect of the foregut, and from this anlage arises a secondary diverticulum, which forms part of the head of the pancreas and also gives rise to the main duct system for the whole of the pancreas. The cellular hyperplasia during the growth of these passages is so great that the lumen of the ducts is obliterated, and it is not until the 5th month that between the cells clefts appear, which, by joining together, re-establish the lumen. Irregular cleft formation and atypical fusion may lead to the formation of accessory ducts, the duplication of parts of the tract, or to cystic dilatation, while lack of canalization or partial canalization gives rise to the various forms of atresia of these passages (Chesterman[3]).

The combination of atresia and cystic dilatation has been reported (Oxley[4]), but obstruction cannot be considered the common cause of the dilatation, for cirrhosis of the liver and diffuse dilatation of the biliary passages is a rare and not a universal finding as it is when obstruction is present, besides in the majority of cases necropsy does not show any obstruction. And, in passing, it may be noted that only 40 per cent of cases of atresia are found in the female sex, which is exactly half the percentage of cases with cystic dilatation.

It appears certain that the pre-existing cause of choledochus cyst is a congenital abnormality, but the precise exciting factor has so far eluded observation. It cannot be a compensation mechanism as is sometimes found after cholecystectomy in man, or as is the case in those animals who do not possess a gallbladder, for this organ has been found normal in function to the Graham Cole Test and also on histological examination. Probably the exciting cause is an associated neuromuscular defect and

compensation fails under certain conditions of stress, particularly during pregnancy and the puerperium, when both the intra-abdominal tension is altered and the effects of hormones associated with these states are acting on the smooth musculature of the body.

Pathology.

Similar congenital malformations may be expected in any part of a duct system arising from a single anlage, but clinically cystic dilatation is almost invariably found in the supraduodenal part of the common bile duct.

McWhorter[5] records a case in which an intrahepatic cyst was also present and quotes 2 cases (Iselin,[6] Schloessmann[7]), in which the pancreatic duct appears to have been involved as well as the common bile duct, a condition also noted by Matthieu[8] and Mayesima.[9] The lower limit of a choledochus cyst is usually sharply defined at the level of the upper border of the duodenum, though its upper limits may be either saccular or fusiform and may reach beyond the common bile duct to incorporate part of the cystic duct or of the right and left hepatic ducts. The duct orifices when seen from the interior are usually small, the efferent one being difficult to find unless connected to the others by a groove, which is often the case.

The gallbladder is usually normal or dilated, but occasionally is atrophic, while the cystic duct is commonly found to be dilated. The liver shows little change, except in the few cases in which definite obstruction is present, when cirrhosis is found. Calculi have been recorded in the cyst and hepatic ducts, but not in the gallbladder. Enlargement of the spleen and ascites are rare and are said to be due to venous thrombosis.

The wall of the cyst is usually thin, but may vary from 2 mm. to 7.5 mm. in thickness (Zinninger and Cash[10]) and in the few cases in which a lining membrane was found intact, it resembled the epithelium of the common bile duct.

The cyst may contain anything from a few ounces to 8 litres (Reel and Burrell[1]) of bile, which may be infected with the typhoid group, or with other organisms. White bile has been recorded (Russell[11]).

The cyst characteristically displaces the duodenum and stomach downwards and to the left, the hepatic flexure down and to the right, the transverse colon downwards and the liver upwards.

Diagnosis.

The three characteristic symptoms are tumour, jaundice and pain, and these are found in 90, 80 and 60 per cent of cases respectively, and any or all of them may have an acute or an insidious onset.

The tumour is primarily situated under the right costal margin, but it may extend into the pelvis, where it has been mistaken for a pregnancy. It is cystic in nature and often dates from childhood.

The jaundice may be intermittent or continuous, and varies from a slight icteric tinge to the deep olive discoloration of a prolonged complete obstruction.

Pain, when present, occurs in the hepatic region, and may vary from intermittent discomfort to continuous pain or even the agony of severe biliary colic, in which case it is frequently followed by jaundice and fever. Lassitude is common, even in otherwise symptomless periods, but there is no evidence of any characteristic dyspepsia, such as is associated with some lesions of the biliary tract.

The diagnosis presents no difficulty if it is borne in mind in patients in whom some of the above symptoms are found and is almost certain if X-ray shows the characteristic displacement of neighbouring viscera, to which reference has already been made.

Prognosis.

The condition has proved fatal in every untreated case of which I can find the records, with the exception of a girl of 14 who died of diphtheria and erysipelas 6 weeks after the onset of the typical triad of symptoms (Heid,[12] quoted by McWhorter).

Treatment.

Various surgical procedures have been attempted.

Marsupialization is almost invariably followed sooner or later by sepsis and death, unless a secondary anastomosis is performed, allowing internal drainage.

Anastomosis of the cyst to the duodenum has given good results, though theoretically it would be better to excise as much of the cyst as possible first to lessen any tendency for drainage in the reverse direction.

Excision and hepaticoduodenostomy is an operation of great difficulty, both from the point of view of control of haemorrhage and the making of the anastomosis, and it is quite out of the question with an ill patient or a large cyst.

The after results of anastomosis have been good on the whole, though a few cases have suffered from infection of the biliary passages. The anastomosis should be made so that there is dependent drainage into the duodenum in the erect posture and it should also be made about 4 cm. in length to allow for the roughly 50 per cent stenosis which usually occurs after anastomoses between the biliary and alimentary tracts. A larger opening tends to increase the risk of reverse flow into the biliary tract.

Finally, the anastomosis should be made through the site of aspiration, for in 2 cases (Schloessmann,[7] Weiss,[13] quoted by McWhorter) death occurred from biliary peritonitis, due to leakage at the site of puncture.

Report of a Case Complicating Pregnancy.

City General Hospital, Sheffield.

Case numbers: 141990, 142416, 145356.

A.C. Age 29. Married. Housewife.

Admitted 5.5.41. 26.5.41. 21.10.41. 27.8.43.
Discharged 18.5.41. 18.6.41 1.11.41. 9.9.43.

Complaint. Pregnancy and a "run-down feeling."

History of Present Complaint. Patient was admitted to the Maternity Service 16 weeks pregnant, feeling in poor health for the past month. There were no specific complaints.

Patient's Previous History. Perfectly well all her life except for measles in childhood. Married. First pregnancy now. Never had jaundice.

Family History. Satisfactory; no history of congenital deformity.

Condition on Examination. The Maternity Department did not find any obstetrical abnormality, though there was a tumour in the right hypochondriac region which it was considered could neither be attached to the uterus nor an ovarian cyst. The patient was a small-built, but wiry woman. Evidence of jaundice was not present.

Alimentary System. Tongue and teeth satisfactory.

Blood group IV (Moss). Blood W. R. negative. Blood N.P.N. 22 mg. per cent.

Urine. Microscopical and bacteriological examination. Nothing abnormal found.

X-ray Reports. May 12th, 1941. Preliminary film shows large rounded dense shadow continuous with the liver, projecting down into the right hypochondrium, pushing colon down and to the left. Foetal bones cannot be distinguished.

May 12th, 1941. Intravenous pyelogram. Excretion is normal and there is no hydronephrosis, but the right kidney is pushed downwards and backwards by the mass. The nature of the mass is uncertain, but appearances suggest that it is an enlarged liver.

May 13th, 1941. Barium meal shows the stomach

and duodenum to be pushed to the left, but otherwise there is no abnormality.

May 14th, 1941. Twenty-four hours later the barium is still in the transverse colon, which is pushed down, and the pelvic colon, which is pushed up by a pelvic mass.

May 17th, 1941. Cholecystogram (oral). A faint shadow is seen at 16 hours, which is small and situated close to the lateral border of the mass. There was no change ¾ hour after a fatty meal.

Conclusion. Mass probably due to enlarged lobe of the liver.

I felt that the probable diagnosis was congenital cystic dilatation of the common bile duct, and laparotomy was advised.

May 18th, 1941. Patient took her discharge for domestic reasons, as her husband was on military leave.

May 26th, 1941. Re-admitted. General condition much worse (see blood counts given below) and she complained of pain in the tumour, which was considerably increased in size.

Abdomen. Inspection showed some hypogastric fullness and also a swelling in the right hypochondriac region, which moved on respiration.

Palpation revealed a definitely palpable uterus and also a tense, tender, fluctuant tumour in the right hypochondriac region. The tumour was separable from the just palpable liver margin when the patient was erect, and tended to present in the loin, but did not bulge in that direction as much as would be expected from a renal tumour the size of a small coconut.

Percussion did not suggest that bowel lay in front of it and auscultation revealed nothing of note.

Cardio-vascular System. Nothing abnormal found. Blood-pressure 124/76.

Respiratory System and Nervous System. Nil abnormal found.

My impression was that it was probably a right side hydronephrosis or possibly a mucocoele of the gallbladder.

On consultation with Dr. W. J. Clancy (Head of the Obstetrical Department) it was decided to investigate fully rather than to resort to immediate laparotomy. Until receiving his advice I was undecided, as it has been suggested that X-ray investigations should not be carried out during pregnancy, even as late as the 16th week, for fear of injury to the foetus.

Laboratory Investigations.

	May 6th, 1941	May 28th, 1941
Haemoglobin	68 per cent	42 per cent
Red cells	4,620,000	3,860,000
Colour index	0.74	0.55
White cells	9,350	9,200
Differential count.		
Neutrophils	75 per cent	78 per cent
Eosinophils	1 ,, ,,	1 ,, ,,
Monocytes	2 ,, ,,	1 ,, ,,
Lymphocytes	22 ,, ,,	20 ,, ,,

No other or abnormal cells seen.

May 28th, 1941. Platelet count 212,300; bleeding time 2½ minutes; coagulation time 8½ minutes.

Aschheim Zondek Test. Positive for pregnancy, but the dilution tests did not suggest the diagnosis of chorionepithelioma with secondaries in the liver.

May 28th, 1941. Two pints of blood were given and plenty of glucose drinks by mouth.

The provisional diagnosis was choledochus cyst, on account of the diffuse monocytic nature of the mass, which gave rise to the typical visceral displacements on X-ray examination.

Operation was advised, as the patient's deterioration in health was considered to be due to this lesion and not to any toxaemia of pregnancy.

May 30th, 1941. *Operation.* The patient was given atropine gr. 1/100 and morphia gr. 1/6, 45 minutes before operation and open ether with oxygen was the anaesthetic used.

A right upper paramedian incision was made from the costal margin to 1 inch below the umbilicus. Skin towels were then applied and the muscle split into an outer two-thirds and an inner third before the peritoneum was opened.

On opening the belly a large cystic swelling, the size of a grapefruit, presented. The liver and gallbladder were pushed up and to the right, the stomach was pushed to the left and the duodenum downwards and to the left, as also was the transverse colon. There did not appear to be any other abnormality present and the uterus was present and enlarged to about 16 weeks.

The abdominal cavity was then carefully packed off and the cyst was aspirated just by the upper margin of the first part of the duodenum, which was retracted downwards, and clean green bile was obtained. Thirty-two ounces were aspirated, then the puncture site was closed with a light intestinal clamp (Carwardine) and the relations of

the cyst were examined more fully. It was found to come off a somewhat dilated common duct immediately above and behind the first part of the duodenum and appeared to join the duct by a wide neck, so it was considered safer to perform an anastomosis with the duodenum rather than resect.

Carwardine clamps were applied to the duodenum and the cyst and a 1½-inch anastomosis was made between them. Silk was used for the outer layer and catgut for the inner layer of the anastomosis. There was no difficulty in spite of the thinness of the cyst wall. The abdomen was closed in layers without drainage.

The final diagnosis was that of choledochus cyst.

The *post-operative* course was uneventful.

The patient was given Vitamins A, B, C and D by mouth for a week and K intramuscularly for 4 days, also large doses of Progestin, intramuscularly, for a week.

The stitches were removed on the 10th day and as the urine did not show any abnormality on chemical and microscopical examination—the N.P.N. was 27 mg. per cent and the blood-pressure normal—the patient was allowed up on the 17th day and discharged home, to remain under the care of the Obstetric Unit, on the 19th day. Her pelvigram was normal.

Follow-up. Patient attended the Maternity Department every fortnight until October 21st, 1941, when she was admitted in labour and delivered of a 38-weeks male child, spontaneously.

The patient's condition was satisfactory throughout and she was discharged on November 1st, 1941.

The baby was a microcephalic male with a very distended abdomen and died in convulsions on October 25th, 1941. The postmortem (abdomen only) did not show any abnormality of the biliary system, but a complete septum across the jejunum about 18 inches from the duodenojejunal flexure. The gut distal was collapsed, but not atresic. The septum was of mucosa and submucosa only and was merely a thin diaphragm across the lumen.

July 29th, 1942. Re-admitted for 2 days for X-ray examination. Patient was well in every way and clinically there were no abnormal findings.

X-ray Reports. The stomach is now situated normally and appears normal in all respects. Barium from the duodenum, near the apex of the cap, into an irregular, rather loculated, but small area, which is apparently the shrivelled remnant of the cyst, and on through the dilated hepatic duct into its finer branches in the liver. There was no delay in the passage of the barium through the small and large intestine. At 24 hours traces of barium are present in cyst, the gallbladder and hepatic ducts.

Further barium was then given with a Seidlitz powder, after which some barium and gas passed into the cyst and hepatic ducts, showing fairly well the size of the shrivelled cyst and the dilated hepatic duct.

Oral cholecystogram was not satisfactory.

January 13th, 1943. Symptomless.

May 12th, 1943. Symptomless, but 5½ months pregnant.

August 27th, 1943. Re-admitted and delivered of a live female child.

September 9th, 1943. Discharged, condition of mother and child satisfactory.

Relation with Pregnancy and the Puerperium.

Fourteen cases are recorded as associated with pregnancy and the puerperium, and of these 8 showed the onset of symptoms (5) or severe exacerbation (3) during pregnancy, 4 (3 onset, 1 exacerbation) came on in the puerperium, and 2 had complete remission of symptoms during these periods.

The diagnosis of the 8 cases presenting symptoms during pregnancy merits further discussion. Five of these cases showed symptoms during the 2nd to 4th months and require no further comment, save that it is safer to operate at once if the condition is deteriorating rather than to wait until after confinement, or to terminate pregnancy in the hope of relief.

The remaining 3 cases occurred in the 7th and 8th months, and all were mistaken for eclampsia. Labour was induced in 2, with no relief in 1 case, and with relief of jaundice but aggravation of the remaining symptoms in the other case, while the

third went to term and the tumour was first noticed after delivery, which did not give rise to any amelioration of symptoms.

The diagnosis of choledochus cyst rather than toxaemia rests on the obstructive nature of the jaundice, which is not the case in acute yellow atrophy of the liver in pregnancy, whether idiopathic or following hyperemesis, eclampsia or chloroform poisoning.

The treatment near term should undoubtedly be conservative if possible, as access to the region is rendered difficult by the enlarged uterus. In fact, the diagnosis and treatment will usually be that of acute calculous cholecystitis, as the cyst is all but impossible to palpate.

Two cases are reported to have had a further pregnancy and puerperium after operation without further symptoms.

Summary.

1. The world's literature is reviewed and a new case recorded.

2. The diagnostic points are tumour, obstructive jaundice and pain, while X-rays show a typical displacement of the stomach and duodenum down and to the left, the transverse colon downwards, and the liver upwards.

3. All cases terminate fatally unless operated upon and anastomosis to the duodenum is a simple and satisfactory procedure.

I wish to thank Dr. J. Rennie, Medical Officer of Health, and Dr. J. Clark, Medical Superintendent, for allowing me to publish this case; also to record my thanks to Dr. W. J. Clancy for asking me to treat this patient and his continual help in so doing.

Without the assistance of the Librarian of the Royal Society of Medicine this paper could not have been written, and it is a pleasure to record once more my indebtedness to him.

Summary of Reported Cases Associated with Pregnancy and the Puerperium.

1. Reported by Bachkiroff.[14] Aged 21. The symptoms of large tumour and marked jaundice but without pain came on immediately after the first confinement. The pre-operative diagnosis was hydatid cyst and the patient died of haemorrhage after an attempted excision.

2. Reported by Backer-Grondahl.[15] Aged 23. The symptoms were intermittent jaundice for many years but continuous for the 7 months before operation, colic pain on and off for 11 months and tumour for 5 months. The pain and jaundice became marked in the 8th month of pregnancy and eclampsia was diagnosed. The pre-operative diagnosis was choledochus cyst but the patient died of cholangitis 5 weeks after anastomosis to the duodenum.

3. Reported by Bull.[16] Aged 42. The patient had suffered from attacks of pain between the ages of 7 and 16 and again after the age of 35. At 33 she had a slight attack of jaundice and a tumour was noticed for only a few weeks before Bull first saw her. Five operations were performed and she was eventually discharged with an external biliary fistula. She was alive 1 year later. Pregnancy relieved her symptoms.

4. Reported by Dressmann.[17] Aged 24. The patient had had intermittent pain and jaundice since infancy and a tumour for 16 years. The tumour rapidly increased in size and the jaundice became marked after delivery of the first child. The pre-operative diagnosis was one of hydatid cyst and the patient died of cardiac failure 3 months after external drainage immediately following an attempt at internal anastomosis.

5. Reported by Goldammer.[18] Aged 21. The typical triad started after delivery of her first child. The pre-operative diagnosis was one of hydatid cyst and the patient died after an attempted excision.

6. Reported by Hildebrand.[19] Aged 18. Symptoms of jaundice and tumour started at the 7th month of her first pregnancy. After delivery at the third attempt a successful anastomosis was made into the duodenum and the patient was alive and well 5 years later and had had a normal pregnancy during that period.

7. Reported by McWhorter.[20] Aged 49. The patient had suffered from attacks of jaundice and

pain since infancy but no tumour was ever noted. The patient had 8 pregnancies and in every case the symptoms are made worse from the 4th month and were relieved by delivery. The preoperative diagnosis was stone in the common bile duct, cholecystostomy was first performed then hepatico-duodenostomy with excision of the sac. The patient died 13 years later of diabetes mellitus and hypertension.

8. Reported by Seyffert.[21] Aged 23. The typical triad appeared immediately after her first confinement. Pancreatic cyst was diagnosed and the patient died of secondary haemorrhage 6 weeks after external drainage.

9. Reported by Smith.[22] Aged 28. The patient had had intermittent jaundice and pain for 10 years but a tumour was never noted. Her two pregnancies were both associated with a marked increase of symptoms and the patient died after a third operation which was an attempt at an anastomosis.

10. Reported by Sénèque and Tailhefer.[23] Aged 32. The patient suffered from the typical triad of jaundice, pain, and tumour all her life but the symptoms were relieved by pregnancy. The preoperative diagnosis was cholecystitis and recovery followed anastomosis to the duodenum.

11. Reported by Tailhefer.[24] Aged 24. The typical triad came on at the 4th month of her first pregnancy. Choledochus cyst was diagnosed and successful anastomosis to the duodenum was performed.

12. Reported by Walton.[25] Aged 34. Patient had suffered from biliary colic for 8 years which came on during the 8th month of her first pregnancy. The cyst was anastomosed to the duodenum but she had suffered from mild attacks of cholangitis during the 6 years following operation.

13. Reported by Zinninger and Cash.[10] Aged 40. Her only symptom was pain which became much worse at the 4th month of her first pregnancy. She died 12 days after an attempt at anastomosis to the duodenum.

14. Author's case. Aged 29. Symptoms of tumour started during the 4th month of her first pregnancy. Choledochus cyst was diagnosed and anastomosis to the duodenum performed. Pregnancy continued normally and the patient has had a second normal pregnancy since operation. She is symptomless 3 years after operation.

REFERENCES.

1. Reel, P. J. and N. E. Burrell. *Ann. Surg.*, 1922, lxxv, 191.
2. Heiliger, 1910, quoted McWhorter. *Arch. Surg.*, 1924, viii, 604.
3. Chesterman, J. T. *Brit. Journ. Surg.*, 1941, xxix, 52.
4. Oxley, M. G. B. *Lancet*, 1883, ii, 988.
5. *McWhorter, G. L. *Arch. Surg.*, 1924, viii, 604.
6. Iselin, H. *Arch. f. klin. Chir.*, 1927, cxlv, 304.
7. Schloessmann. *Deutsche Zeitschr. f. Chir.*, 1911, cix, 161.
8. Matthieu, J. *Ann. Surg.*, 1930, xcii, 158.
9. Mayesima, J. *Deutsche Ztschr. f. Chir.*, 1912, cxix, 338.
10. *Zinninger, M. M. and J. R. Cash. *Arch. Surg.*, 1932, xxiv, 77.
11. Russell, R. N. *Ann. Surg.*, 1897, xxvi, 692.
12. Heid, quoted McWhorter. *Arch. Surg.*, 1924, viii, 604.
13. Weiss, S. *Berl. klin. Wochenschr.*, 1909, xlvi, 1843.
14. Bachkiroff. *Chir. Arch. Veliaminova*, 1927, xxvii, 63.
15. Backer-Grøndahl, N. *Med. Rev. Bergen*, 1933, l, 337 (Case No. 2).
16. Bull, P. *Nord. Med.*, 1939, i, 31.
17. Dressmann. *Deutsche Zeitschr. f. Chir.*, 1908, xcii, 401.
18. Goldhammer. *Beitr. z. klin. Chir.*, 1907, lv, 214.
19. Hildebrand. *Deutsche med. Wochnschr.*, 1913, xxxix, 2224.
20. McWhorter, G. L. *Arch. Surg.*, 1939, xxxviii, 397.
21. Seyffert, R., 1888, quoted McWhorter. *Arch. Surg.*, 1924, viii, 604.
22. Smith, B. C. *Arch. Surg.*, 1942, xliv, 963.
23. *Tailhefer and Sénèque. *Journ. de Chir.*, 1929, xxxiii, 154.
24. Tailhefer, A. *Bull. Soc. Nat. Chir.*, 1934, lx, 8.
25. *Walton, J. *Brit. Journ. Surg.*, 1939, xxvii, 295 (Case No. 2).

* These articles contain an excellent survey of the literature.

An Analysis of 90 Cases of Transplantation of the Ureters for Obstetrical Vesico-vaginal Fistula

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THE series here analysed consists of all the patients so treated from 1936 to mid-1942 at the Native Civil Hospital, Nairobi. Only those who survived unilateral transplant and refused operation, or did not return for the completing operation, are excluded.

Obstetrical vesico-vaginal fistula is common in East Africa. The cause appears to be long delay in the 2nd stage of labour, often in the presence of a greatly distended bladder.

Almost all the cases seen are in those patients who have been delivered in the villages or brought into hospital with a history of having been 2 or 3 days in labour. The reasons for the difficult births vary, but neglect is the common factor. The condition occurs in all the territories, but of the cases quoted here, approximately 90 per cent of the patients are from tribes who practise a very radical degree of so-called "female circumcision."

This operation, carried out in the villages at the onset of puberty, consists of the excision, with a sort of shallow gouge, under filthy conditions, of the clitoris and a lesser or greater amount of the anterior commissure and labia minora. The wound heals with a degree of fibrous contraction which depends on the extent of the wound and the severity of the inevitable sepsis. Atresia of the vulva to some extent occurs in all these patients. In many it is extreme. That this is a cause of delay with the head on the perineum is undoubted when labour takes place in the villages, since episiotomy is frequently necessary in midwifery centres. The history seldom varies from that of a difficult delivery in the village with the birth of a dead baby followed by incontinence. The following recent case is typical.

A native primipara was admitted as a case of obstructed labour. She stated that she had been 2 days in labour. The head, with a marked caput, was high but the os was fully dilated. The bladder was enormously distended.

The bladder was emptied by the Sister with a silver catheter through an apparently normal meatus, and the dead baby delivered by the forceps with a certain amount of difficulty. Next morning a hole, 1.5 cm. in diameter, centred upon the urinary meatus was evident, leading straight into the bladder, and the woman was incontinent of urine. This case emphasizes the factor of a distended bladder tending to accentuate the thinning of the anterior vaginal wall which, nipped between the head and the symphysis pubis gives way from ichaemia and consequent sloughing often within a few hours.

Local repair has been attempted, often several times when it has appeared likely to be successful, but in many cases the lesion amounts to a gap in the anterior vaginal wall through which the cherry-red inflamed mucous membrane of the bladder may be seen pouting. In such cases and those in which the fistula is high up or tight against the symphysis and thus

inaccessible, or is surrounded by dense scar tissue, local treatment has failed in our hands. For smaller soft fistulae local repair in two layers with reinforcement of the vaginal sutures by silver wire, together with prone nursing and suprapubic drainage through a hole in the mattress, has sometimes been successful. Usually, however, lack of co-operation by the ignorant native women and but semi-skilled attention by African nurses causes a breakdown in postoperative treatment.

Transplantation was commenced in 1936 using Winsbury-White's method of imbedding the undivided ureters into the wall of the colon at a first operation, section and anastomosis being performed at a second operation 3 weeks later. Nineteen patients were so treated with 4 deaths (Table I). This method produced technical

TABLE I—PERIOD 1936 TO 1938.

Type of operation	Number of cases	Deaths	Causes of death	Complications (remarks)
Winsbury-White's method.	19	4	Peritonitis (2)	1 External urinary fistula.
			Pyelonephritis Under anaesthesia (at 2nd operation)	1 Hydronephrosis
A complete transplant of one ureter at each of two operations by Stiles's method.	8	–	–	–
Complete transplant of both ureters at one operation.	5	–	–	–

TABLE II—1939.

Reg. No.	Type of operation. Coffey's technique No.	Stages	Result	Remarks
109	1	Two	Recovery	
160	1	One	Recovery	
178	1	One	Recovery	
741	1	One	Died	Pyelonephritis.
840	1	One	Recovery	
1154	1	One	Recovery	
2031	1	Two	Recovery	
2206	1	One	Recovery	
3425	1	One	Died	Pneumonia.
2508	1	One	Recovery	
3039	1	One	Recovery	
3488	1	One	Died	Double pyelonephritis.
3951	1	One	Died	Persistent bleeding into rectum and pyelonephritis.
4103	1	Two	Recovery	
4662	1	One	Died	Haemorrhagic nephritis.
4494	1	Two	Recovery	
4957	1	Two	Recovery	
6319	1	Two	Recovery	
4930	1	Two	Recovery	
5264	1	Two	Recovery	

difficulties, adhesions at the site of the first operation often making identification of the point of junction difficult at the later operation.

Furthermore it was felt that the theory that imbedding of the intact ureters into the bowel wall prevents the ascent of infection by the lymphatics was not entirely sound since those in the muscular and submucous layers are opened upon section of the ureters at the second operation. In effect this technique is a double anastomosis upon a patient who has had the strain of a previous abdominal operation a few weeks earlier.

Thereafter one ureter was completely transplanted at one sitting and the other when it was found that the first kidney had not been infected, or, if some pyelitis had occurred, it had had time to settle. The advent of the sulphonamides cut down the incidence of pyelitis to such an extent that all 8 of these patients recovered smoothly. This experience emboldened us to select patients in whom the kidneys were in good condition for double complete transplantation at one operation. Five in this period were thus treated without any deaths.

In 1939 (Table II) there were 20 cases,

TABLE III—1940.

Reg. No.	Type of operation. Coffey's technique No.	Stages	Result	Blood urea before operation (mg. per c.c.)	Blood urea after 1st operation	Remarks
237	1	Two	Recovery	—	—	
680	1	Two	Recovery	40	40	Discharged on 20th post-operative day.
757	1	Two	Recovery	44	36	Discharged on 14th post-operative day.
684	1	Two	Recovery	51	37	
1449	1	Two	Recovery	44	31.5	Double ureters on right side, both transplanted.
1779	1	Two	Recovery	38.2	36	Ureters as thick as lead pencil.
2827	1	Two	Recovery	33	27.2	Discharged on 17th day.
5986	1	Two	Recovery	—	—	
6990	1	Two	Recovery	—	—	
6989	1	Two	Recovery	29	—	After 2 attempts at local repair.
7498	1	Two	Recovery	—	—	
7579	1	Two	Recovery	34.2	—	Also recto-vaginal fistula.
7604	1	Two	Recovery	36.6	—	Discharged on 21st day.
8152	1	Two	Recovery	23.1	—	After 2 attempts at local repair.
8780	L. 1. R. II.	Two	Recovery	—	—	
8916	1	Two	Recovery	—	—	
9159	L. I. R. II.	Two	Recovery	—	—	
9927	L. I. R. II.	One	Recovery	38.9	—	Temperature reached normal on 3rd day and remained so thereafter.
9925	R. I. L. II.	Two	Died	37.2	—	Normal convalescence after 1st operation. Died of lobar pneumonia.

Blood urea records were commenced in 1940. A blank in the column indicates 'no record available.'

in 8 of which the ureters were transplanted separately and in 12 together. There were no deaths in the unilateral series and 5 in the bilateral series. These figures led to virtual abandonment of the double transplant during 1940, when 18 out of 19 cases were transplanted in two stages with only 1 death. Of these, Coffey's No. 2 technique, using fine rubber tubing was used for one ureter in 4 cases (Table III).

In 1941 there were 11 cases with 3 deaths, 1 of which occurred on the table under general anaesthesia (Table IV). Of these, 6 were simple Stiles's operations with 1 death; 1 in which one ureter was transplanted with, and the other without, insertion of a tube into the ureter, with recovery; 2 in which No. 2 technique was used separately for both ureters with 1 death (again under general anaesthesia); and 2 in which the double transplant at one sitting was by No. 2 technique with recovery.

In 1942, to the end of August when the series was closed, there were 8 cases without mortality (Table V). Of these 4 were by No. 1 method, separately. In 3 the double operation by No. 2 technique was carried out at one operation, and in 1 case each ureter was done by a different method at the same time.

It must be emphasized that "recovery" here means operative recovery only. Follow-up in native practice is almost impossible. The women return to their Reserve and cannot be traced by postal or other method, although certain patients have been seen again when attending district dispensaries for other conditions.

TABLE IV—1941.

Reg. No.	Type of operation. Coffey's technique No.	Stages	Result	Blood urea before operation	Blood urea on discharge	Remarks
2242	1	Two	Recovery	50.2 35.2	—	Discharged 13th day.
4197	1	Two	Recovery	30.7	—	Recovery delayed by malaria.
4012	1	Two	Recovery	57.0	—	Preliminary laparotomy for discharged on 17th day after 2nd transplantation.
4082	1	Two	Died	37.0	—	Pyelonephritis.
5548	1	Two	Recovery	32.9	—	Discharged 13th day.
6218	1	Two	Recovery	36.1	—	
7633	L. 1. R. 2.	Two	Recovery	32.9	47.5	Discharged 14th day.
9921	2	One	Recovery	45.0	31.7	One tube did not drain? Came out and lay in rectum.
9721	2	One	Died	—	—	Apparent leak at right anastomosis. Double pyelonephritis.
11167	2	Two	Recovery	35.6	—	
11481	2	Two	Died	40.8	After first 25.2	Normal convalescence from 1st operation. Died under general anaesthetic.

TECHNIQUE.

Preparation. Following admission the patient rests in hospital for several days to settle down and have kidney function tests carried out. Local examination must be

undertaken on the table in lithotomy position in a good light. The possibility of 2 fistulae must be investigated and coincident rectovaginal fistula ruled out.

On the morning before operation an ounce of castor oil is taken and an enema

raised from its retroperitoneal bed for about 1½ inches and divided distally. The proximal cut end is split into two flaps about 3 mm. deep. One flap is transfixed by a single ligature each end of which, threaded on a moderately large needle, is

TABLE V —1942.

Reg. No.	Type of operation. Coffey's technique No.	Stages	Result	Blood urea before 1st operation	Blood urea before 2nd operation	Blood urea on discharge	Remarks
628	L. 2. R. 1.	One	Recovery	25.9	—	216.7	Very fit in spite of high blood urea upon discharge 15th day.
1283	1	Two	Recovery	26.0	30.5	40.7	Two and a half months pregnant at 1st operation. Septic phlebitis. Aborted. Uneventful convalescence from 2nd operation.
40	1	Two	Recovery	34.2	No record	37.2	Septic phlebitis after 1st operation
1793	2	One	Recovery	28.5	—	31.0	Normal convalescence 2nd operation. Returned after 2 months for repair of recto-vaginal fistula. Blood urea now 65.8. Successful repair.
2283	2	One	Recovery	23.7	—	43.8	Discharged on 17th day.
2862	1	Two	Recovery	26.4	No record	26.6	Some rectal bleeding after 1st operation.
3975	1	Two	Recovery	42.3	32.9	No record	Discharged on 13th day.
4657	2	One	Recovery	35.3	—	24.4	Blood urea rose to 114.1 during post-operative broncho-pneumonia and had dropped to 24.4 8 days later.

administered that evening, fluids only being allowed by mouth. The enema is repeated early on the morning of operation.

Anaesthesia. Spinal anaesthetic (stovaine) and endotracheal ether and oxygen have been used in this series. The former gives ideal relaxation and the state of contraction of the intestines facilitates exposure.

Methods. No. 1 technique is a simple ureterocolic anastomosis. The ureter is passed through the opening in the bowel and brought out again not less than 1 inch lower down. Tension on the ends draws the ureter into the bowel. They are then tied and the bowel closed. A light bite of the ureter to fix it in position is taken by one or two of the ligatures closing the mucosa, and the serous layer is closed by Lembert stitching continued back to the point of emergence of the ureter, so as to bury completely the extent of its exposure

in a peritoneal tunnel. The inevitability of some oedema of the ureter must be allowed for which may turn a mild bend into an obstructing kink if care is not taken, so that tight stitching is to be avoided around the neck of the ureter. No attempt is made to produce a valve by running the ureter through a serous tunnel before it penetrates the mucosa. No. 000 chromic catgut is used throughout.

In No. 2 technique two rectal tubes are passed before the operation is commenced. Fine rubber tubing is inserted for not more than 2 inches into the ureter, a size being selected which just fits the lumen snugly. It is fixed by a ligature around the ureter near the ostium, tied tightly enough to retain it in position without obstructing the lumen. Patency of the tubing must be confirmed before insertion. The beak of one rectal tube is made to point opposite the site for the anastomosis, and the colon cut upon it until the point protrudes. The end of the fine tube is fixed to the rectal tube by a stitch or Michel clip and the rectal tube withdrawn by an assistant, thus drawing the ureter into the bowel. As soon as the ureter has passed into the bowel the fine tubing is cut by the assistant, leaving a length protruding from the anus, and the rectal tube removed. The procedure is repeated on the other side with the second rectal tube, sulphonamide powder is dusted over the anastomosis sites and the abdomen closed without drainage.

Post-Operative Course.

In many patients treated by No. 1 technique there appears to be a temporary suppression of urine and not much is passed up to 48 hours. This may be due to active reabsorption of the water content of the urine from the empty colon. Intravenous sodium sulphate usually produces diuresis and a small flatus tube ensures that urine is not being retained by anal spasm. With the No. 2 technique this oliguria does not take place, and it is very comforting to see urine constantly dripping from the ends of both tubes. They usually cease to drain in 4 or 5 days, often coincidentally with the first bowel motion, which probably shows that their upper ends have by then been extruded by the ureter into the rectum. Failure to drain is a signal for withdrawal which can safely be carried out at any time.

Both types of patients are nursed in Fowler's position sitting on an air ring laid over a bedpan. Bowels are kept confined for 4 days, after which gentle peristalsis is produced by a senna mixture or cascara and paraffin. Enemata are not permitted for fear of straining the anastomosis. A rise of temperature to 100°F. often occurs nightly for 2 or 3 days. Sometimes this is undoubtedly due to a minor degree of ureteritis and pyelitis but respiratory infections following endotracheal ether in Nairobi's climate and altitude is a contributory factor. It appears more commonly with No. 1 technique. In many patients operated upon under spinal anaesthesia, and with No. 2 technique, the temperature does not rise more than a degree throughout convalescence. It is rare for a patient to be retained in hospital longer than 3 weeks after the single or final operation.

Blood urea estimations are given in the tables where known. The very common finding of a lower reading after the operation is difficult to explain. The estimation is not the most perfect test of kidney function, but is the only one available in the circumstances. Any degree of post-operative pneumonia or dehydration from vomiting causes an increase of azotaemia, which rapidly drops following treatment. Sulphonamides (usually sulphapyradine) are given whenever pyrexia occurs.

RESULTS OF DIFFERENT METHODS.
(OMITTING 2 ANAESTHETIC DEATHS)

Type of operation	Cases	Deaths	Mortality, per cent
A. Winsbury-White's	19	3	15.8
B. No. 1 in two stages	41	1	2.4
C. No. 1 in one stage	17	5	29.7
D. No. 2 in two stages	2	–	—
E. No. 2 in one stage	5	1	20.0
F. Mixed in two stages	4	1	25.0
G. Mixed in one stage	2	–	—
Average mortality 12.2 per cent			
All types in one stage	24	6	25.0
All types in two stages	66	5	7.8

CAUSE OF DEATHS.

Peritonitis	2
Pyelonephritis and uraemia	5
Pneumonia	2
Under anaesthesia (endotracheal ether)	2
Persistent bleeding from anastomosis into bowel	1
"Haemorrhagic nephritis"	1
	13

Operative mortality 14.4 per cent

NON-FATAL COMPLICATIONS.

Unilateral hydronephrosis	1
Septic phlebitis of femoral vein	1
Septic phlebitis of femoral vein plus abortion	1
External urethral fistula	1

Deductions from such a small number of cases must be made most cautiously. All that can be said from these figures is that, in our hands, operation in two stages has been the most successful.

SUMMARY AND CONCLUSIONS.

A series of 90 cases is presented of obstetrical vesico-vaginal fistula treated by ureterocolic anastomosis with an operative mortality of 14.4 per cent.

The methods used are briefly described and their results analysed.

The transplantation of one ureter at a time by the simplest technique has produced the best results.

A follow-up has not been possible. The surgeons responsible for the treatment of these cases were Mr. C. V. Braimbridge, M.V.O., F.R.C.S., Surgical Specialist, Kenya, for whose permission to publish I am grateful; Dr. H. Nelson Turner, and the author, his assistants.

Artificial Insemination

(Report on 80 cases.)

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HISTORICAL.

IN 1870 Spallanzani inseminated, artificially, a dog, and following him, John Hunter successfully inseminated a woman with the spermatozoa of her own husband, suffering from hypospadia.

This remained, however, for a long time unnoticed. In 1860 Marion Sims reported one successful insemination in a woman suffering from stenosis of the uterine introitus. He enlarged the cervix and introduced the semen into the uterine cavity. Again, many years elapsed before Doederlin and Ivanoff introduced artificial insemination into medical practice: the first in human, the second in veterinary surgery. This method gained a foothold firstly in veterinary practice, and lately gynaecologists took it up for treatment of sterility.

Papers on this subject come so far mainly from the U.S.A and the U.S.S.R. Special reference is made to the comprehensive review on nearly 10,000 cases from all over the U.S.A. (Seymour and Koerner).[1]

Our own material, which represents the subject of this report, is based on the experience of 80 cases of artificial insemination.

The indication for adoption of this method of treatment we divide into 3 groups:

1. *Defective spermatozoa.*
   (*a*) Severe oligospermia;
   (*b*) Necrospermia;
   (*c*) Faulty germ plasma.
   (*d*) Azoospermia.
2. *Anomalies of the male external genital organ.*
3. *Sterility without evidence of its cause in either of the partners.*

Prior to treatment the spermatozoa of the husband are examined repeatedly, particularly so, as it occurred to us to find differences in results if the spermatozoa were again and again re-examined. Only if the pathological finding was constant this formed an indication as under leading: I. In our experience not only azoospermia but even severe oligospermia found on repeated examinations, is an absolute cause of sterility. For cases falling into this group spermatozoa have to be provided by a donor other than the husband, if a child is desired by the two partners.

TECHNIQUE.

Two methods are described:

(*a*) *The intrauterine method,* necessitating dilatation of the cervix and instillation of the spermatozoa into the cavity of the uterus. This method was entirely abandoned, being unnecessarily complicated, and besides not entirely harmless. It is still practised where stenosis of the cervix or even atresia is the cause of sterility.

(*b*) *The intracervical method*—we adhere to—is simple and satisfactory. The

spermatozoa are introduced either into the cervix or into the posterior fornix of the vagina. For this purpose a syringe mounted with a 4-inches-long needle is used. No deleterious effect of the metal on spermatozoa was observed. Half an hour after installation the patient was allowed up.

The amount of spermatozoa used was 0.2 to 0.5 c.c. In a few cases only drops being available, they still proved to have been sufficient. One donor was usually used for 4 to 8 inseminations carried out within short intervals from each other. The method used in veterinary surgery of diluting the spermatozoa in physiological saline was not adopted.

In 2 instances spermatozoa were used which had been kept in the icebox for 48 hours at a temperature of 3 to 4°C. In neither case was insemination followed by pregnancy. This observation seems to us to be of no significance, as neither of the 2 inseminated patients became pregnant with fresh spermatozoa used later on. However, more attention must be given to the problem of using conserved spermatozoa, and more experimental work must be done in this regard.

In only 2 cases we tried artificial impregnation with aspired testicular substance from the husband suffering from obstruction of the passage due to gonorrhoea. The 2 trials were complete failures. The review of the literature shows only one case of success from this kind of insemination (Walker[2]). The procedure seems, therefore, to be not very promising.

The *time of insemination*: 3 or 4 inseminations were made in each case between the 12th and 18th day of the cycle. Only twice, a single insemination on the 13th and 14th day after menstruation, respectively, was effective. As a rule the procedure had to be repeated in 2 to 6 cycles, and even more often.

The choice of donors. The greatest care is required on this point. A full personal and family history, and complete physical and seriological examination are absolutely necessary.

RESULTS.

Indication	Pregnant	Non-pregnant	Total
1. Defective spermatozoa	23	29	52
(*a*) Azoospermia	20	25	45
(*b*) Oligospermina	1	2	3
(*c*) Necrospermia	1	0	1
(*d*) Faulty germplasm	1	2	3
2. Hypospadias	0	1	1
3. Sterility of unknown cause ...	2	25	27
Total	25	55	80

Out of 80 cases 52 belonged to group I (defective spermatozoa). The best results were achieved in those cases in which azoöspermia was the cause of sterility. Twenty out of 45 were successful. One case of necrospermia was successful. All were inseminated with spermatozoa supplied by donors.

One of 3 cases of severe oligospermia was successful; again spermatozoa were supplied by a donor.

In one case of sterility (lasting 5 years) the husband's spermatozoa contained a normal amount of spermatocytes, but 60 per cent of them were pathological forms. In addition there was an abundance of

crystals and leucocytes. One single insemination with spermatozoa from a donor was followed by pregnancy.

In 2 cases of habitual abortion, spermatozoa from a donor other than the husband were unsuccessfully tried. The spermatozoa of the husbands in both cases appeared to be pathological. Although both were failures we do not rule out habitual abortion as being worth further trial, provided artificial insemination is reserved for cases in which faulty germ plasm is the aetiology.

Out of 28 cases in which the husband's semen was used only 2 inseminations were followed by pregnancy.

Discussion.

For the time being the main indication for artificial insemination is defective spermatozoa of the husband. A second group are women with defective genital activity due to recessive hereditary factors (as Gierke's glycogen disease and Tay-Sachs' amaurotic idiocy). Spermatozoa given in these cases from a donor other than the husband may produce a healthy child; this child remaining a bearer of the recessive factor.

Entirely different is the outlook on erythroblastosis foetalis. It can be taken as proved that this disease is due to the Rh positive factor of the father. Spermatozoa from a Rh negative donor will therefore exclude the possibility of erythroblastosis foetalis in the offspring.

Summary.

Artificial insemination was carried out on 80 women reporting for sterility.

In 52 the cause was defective spermatozoa in their husbands. They were inseminated with spermatozoa of donors other than their husbands, and 23 of them became pregnant.

In 28 patients artificial inseminations were carried out with the husband's spermatic fluid, and only 2 became pregnant.

References.

1. Seymour, F. I. and A. Koerner. *Journ. Amer. Med. Assoc.*, 1941, cxvi, 2747.
2. Walker, K. M. "Male Disorders of Sex." London: Jonathan Cape, 1930, p. 177.

J. OBST. & GYNEC. BRIT. EMP. 51:529-536 Dec. 44.

Recurrent Anencephaly

A Case Report with a Note on the Aetiology of Anencephaly and Allied Malformations.

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THE recurrence of anencephaly in foetuses born in two successive pregnancies is of considerable rarity. The case to be recorded here, however, presents the additional interesting feature of a family history of spina bifida on the maternal side. Such cases appear to indicate the role of heredity in the causation of these congenital malformations.

CASE RECORD.

A healthy young woman, aged 29, was married in 1935. She had had no important disease apart from an attack of pneumonia at 12 years of age.

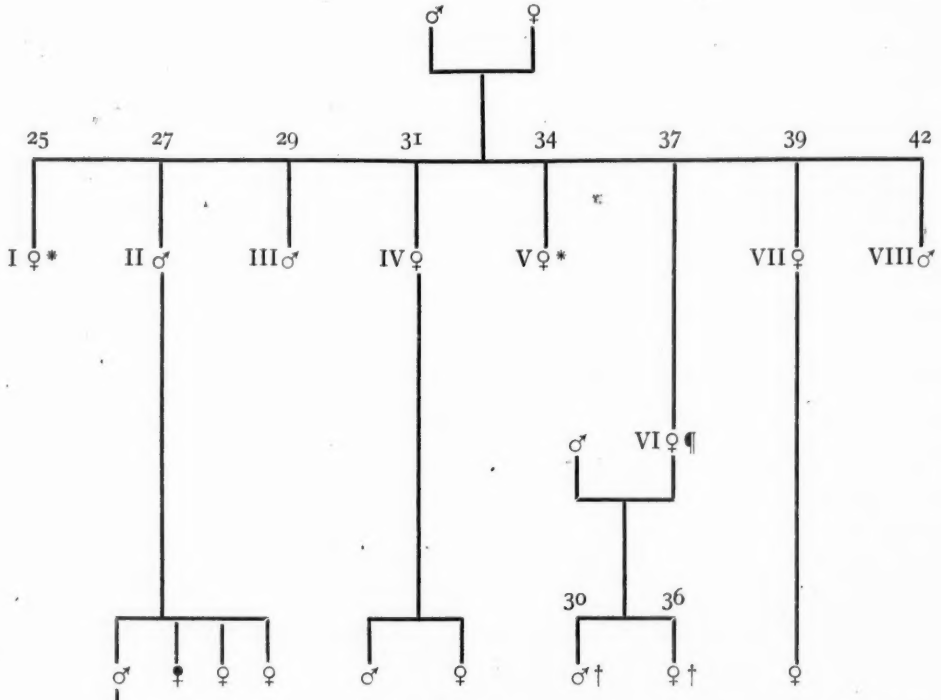
During her first pregnancy in 1936 she experienced great discomfort due to hydramnios. She attended an antenatal clinic where a slight degree of pelvic contraction was diagnosed. No other significant abnormalities were found, but as she was a primigravida suspected of having a contracted pelvis, she was admitted to a London hospital, where a classical Caesarean section was performed on December 30th, 1936, 18 days before the expected date of delivery. The placenta was found to be anterior and in normal position. An anencephalic male child was delivered which had a marked degree of spina bifida. The mother made an uneventful recovery.

After this the patient was worried about the possibility of having a further malformed child and avoided pregnancy until the end of 1941. She then abandoned her precautions in view of the successful pregnancies of other members of her family and on being reassured by her doctor that the malformation was unlikely to recur. In 1942 she found herself pregnant again, the last menstrual period being on February 10th. She felt perfectly well and attended the antenatal clinic of the Cornelia and East Dorset Hospital, Poole. (Dr. J. C. A. Norman.) Hydramnios first became noticeable about the 6th month, and she then experienced some discomfort due to pressure. On September 3rd, 1942, the liquor was found to be grossly excessive and the head was difficult to locate. X-ray examination then showed an anencephalic foetus. The patient was admitted and had a surgical induction of labour on September 28th (Mr. S. Gordon Luker). About 10 pints of liquor amnii were obtained, and the foetus was then palpated in the right "occipito"-posterior position. The following day she was delivered of a stillborn female anencephalic of about 32 weeks' development, weighing 3 pounds 4 ounces. There was marked spina bifida extending down to the upper thoracic region. Placenta and membranes did not show any obvious abnormality. The puerperium was uneventful. The patient's Wassermann and Kahn reactions were negative.

Further radiological examination disclosed that the patient's pelvis, far from being contracted, was slightly larger than the average. A most interesting finding in the antero-posterior view was the presence of a central defect in the sacrum. This consisted of an area in the midline about 2⅝ inches long by ¾ of an inch wide, in

which the arches and spines of the sacral vertebrae were absent. It commenced below the 1st sacral spine and ended at the upper border of the terminal segment. It represented, in fact, a spina bifida occulta of the midsacral segments.

On enquiry it was found that this woman had 3 brothers and 4 sisters, and that 2 of these sisters, who were the first and fifth in the family, respectively, had spina bifida and had died at, or within a few months after birth. No other congenital malformations had occurred in the family, and only one miscarriage (see diagram).



Arabic figures denote maternal age at birth of child.

♀ = Normal.	¶ = Spina bifida occulta.
* = Spina bifida.	I = Died at birth.
† = Anencephaly.	V = Died at 7 months.
• = Miscarriage.	VI = Our patient.

Unfortunately no genetic history is available for the patient's husband as he was a foundling. He enjoys good health and is 5 years older than his wife. In this connexion it may be of interest to note that in a group of 39 families investigated by Murphy[1] in which a malformed child possessed a malformed relative, the malformations were equally distributed between maternal and paternal relatives in the whole group but never affected both types of relatives in any individual case.

Incidence. Similar Cases.

Ballantyne[2] gives the incidence of anencephaly as 1 in 1,460 labours. This is still acceptable as a good average figure, although estimates differ widely. For instance, Malpas[3] from his series calculates an incidence in the general population of 0.308 per cent, i.e. 1 in 325, while

Murphy's[4, 5] figures work out as 0.492 per 1,000, or 1 in 2,032. For comparison the incidence of spina bifida according to "comprehensive statistics" is 1 in 1,000 (Kermauner[6]).

As regards recurrence, Murphy[4] found in a series of 501 mothers with a congenitally malformed child that only 54.9 per cent experienced any further conceptions, and 12.4 per cent of those gave rise to one or more additional congenitally malformed children. As the defects in the first and subsequent malformed children are the same in about 50 per cent of all cases (Murphy[1]) the frequency of recurrence of identical congenital malformations can be calculated as about 3.4 per cent of the incidence of single malformations. In the case of anencephaly, Malpas[3] found that the percentage incidence of this malformation among other members of fraternities containing one anencephalic was 2.6 per cent. The rarity of recurrent anencephaly is thus evident.

Ballantyne[2, 7] had 2 cases of recurrent anencephaly; in one of them the sexes of the monsters were different as in our case. He also quotes Lammert[8] as having noted such an occurrence. Malpas[9] gives details of a case and Penrose[10] lists another. Küstner[11] quoted by Birnbaum,[12] saw a woman who was delivered three times of an anencephalic. Ballantyne[7] mentions three further interesting cases in the literature. Most remarkable is that of Martin[13] who recorded the occurrence of 6 anencephalic births in the reproductive history of one woman who also had 2 normal infants and one other monstrosity, while Carli[14] reported the birth of three successive anencephalic foetuses and Bruneel's[15] patient had 14 labours of which the 4th, 12th and 14th resulted in an anencephalic foetus. Incidentally, Otto[16] and Josephson and Waller[17] recorded cases of twins who were both affected by anencephaly, and Mr. Wilson Clyne (personal communication) encountered a similar case.

The familial incidence of anencephaly has been noted by De Vries*[18] and Boyd[19] quotes Hammond as having met with this in a strain of rabbits. But in man, at least, such cases must be very rare. On the other hand, Murphy[1] mentions 3 cases of anencephalic children who each had a malformed relative suffering from hydrocephalus, hydrocephalus with cleft palate, and from deaf-mutism, respectively.

The family history of spina bifida in our case would appear to be of particular interest in view of the close association between this malformation and anencephaly. First, spina bifida is so common in cases of anencephaly as to constitute almost a part of the deformity. Secondly, their pathogenesis is closely related in that they both represent conditions due to non-closure, or possibly in some cases secondary re-opening or exposure, of the neural tube. (See Boyd.[19]) Thirdly, they have been produced experimentally by very similar methods, e.g. by subjecting frog's eggs to salt solutions of abnormal concentration (Hertwig,[20] Morgan[21]).

Prognosis.

Naturally our patient was most anxious to know whether she was likely to have another anencephalic monster in case of a further pregnancy, and whether she would ever be able to have any normal children. In the present state of our absence of knowledge concerning the exact mode of inheritance of congenital abnormalities of the nervous system we were only able to refer to the experience of recorded cases.

Ballantyne[22] stated bluntly that when a woman had once given birth to an anen-

* Owing to war conditions we were unable to gain access to a copy of this paper.

cephalus there was almost a presumption that she would give birth to a second, or at any rate to some other form of monstrosity. On the other hand, we have seen that Malpas[3] found an incidence of only 2.6 per cent of recurrences among other members of fraternities containing one anencephalic. With regard to malformations in general, he gives the incidence of defects among siblings of malformed subjects as 2.1 per cent. Murphy[4] investigated 431 conceptions following the birth of a malformed child and found that 76.8 per cent ended in the birth of full-time normally developed offspring, 10 per cent in congenitally malformed children, and the rest in miscarriages, premature births and stillbirths. Although these figures show that the incidence of defects among the siblings of malformed children is higher than in the population at large, it hardly amounts to a "presumption" that the mother would give rise to another monster, and there is no evidence that anencephaly is markedly different from other malformations in this respect.

However, for our patient the position was more difficult in that she had already had 2 malformed infants. Presumably women who have had 2 defective children are more likely to have another monster than those who have had only one, but no definite figures appear to be available for the prognosis in these cases. Some obstetricians hold that women who have had 2 anencephalic infants have more than an even chance of having a third if they become pregnant again, but we have found no such statement in the literature. On the other hand, several cases have been described in which normal children followed on 2 malformed ones. Also Murphy[4] found 25 families with at least 2 malformed children where 2 or more normal offspring had followed the birth of the first defective infant, and only 9 out of the 25 had a total of 3 malformed children. So although the patient's increasing age may tend to make the foetus slightly more liable to be malformed (see below), we may perhaps assume that she still has a fair chance of having a normal child. It is, however, possible that such a child might itself have a proportion of malformed offspring.

Aetiology.

In the aetiology of anencephaly, as in that of other congenital malformations, the relative importance of heredity and environment are still disputed. Most authors agree that heredity accounts for the majority of cases, and discussion centres on the role of environment. Part of the difficulty lies in the definition of these terms and the demarcation of the borderline between them. Thus an aetiological factor, e.g., maternal age, may be claimed as environmental by one author and as proof of heredity by another.

Now, heredity is defined as the "tendency of like to beget like" (Oxford English Dictionary), "organic resemblance based on descent; the inheritance of qualities or of diseases from ancestry" (Dorland),[33] and hereditary as "descending by inheritance; (of diseases, instincts, etc.) transmitted from one generation to another; like, the same as, that one's parents had" (Oxford English Dictionary). Therefore a congenital defect cannot be proved to be hereditary unless there is evidence for its existence, or at least for a disposition towards it or a carrier-state for it, in more than one generation. Even if chromosome changes can be proved to be associated with an abnormality, this is not evidence of a hereditary change unless the malformation persists in more than one generation. For instance, X-ray irradiation of sex organs in mice may cause malformation in the offspring, probably associated with chromo-

somal changes; these defects are clearly caused by environmental factors; if they persist in the following generation, they will then be hereditary.

The *evidence in favour of heredity* as a cause of malformations and particularly anencephaly may be examined from this viewpoint.

(1) *Recurrent malformations.* For malformations in general it has been shown that offspring presenting congenital defects are twice[3] or even approximately 24 times[4] as likely to occur in families possessing a congenitally malformed child as in the population at large.

Further the same defect observed in the first malformed child reappeared in a subsequent malformed sibling in about 50 per cent of all cases[1] or even more commonly (Penrose[23]). In anencephaly also, Malpas[3] found that the percentage incidence of this defect among other members of fraternities containing one anencephalic was 2.6 per cent as compared with an incidence in the general population of 0.308 per cent.

Murphy[5] states that "perhaps the single most convincing piece of evidence in favour of heredity is the frequent duplication of defects in brothers and sisters." Yet such cases do not really prove heredity as they only cover one generation, and as Malpas[3] says: "If it is shown that a woman, having given birth to one malformed child, is more likely than a woman with a normal history to produce another malformation, such an observation denotes nothing more than that the maternal factors which determine malformations persist, or recur, in successive pregnancies, although it would certainly show that they are profound and permanent."

Theoretically, malformations recurring in one generation could be explained as due to environmental change (say, an abnormality of the maternal blood or sexual organs), although it must be admitted that such cases as the duplication of rare defects, e.g. absence of the right dome of the diaphragm in 2 siblings, or the duplication of malformations in children born to the same father with different mothers, are strongly suggestive of a hereditary cause.

(2) *Familial incidence.* This would really appear to be the strongest evidence in favour of heredity. Ideally it would be most satisfactory if the incidence followed definite Mendelian ratios, but this does not often occur with malformations. Also whereas certain conditions, e.g. hexadactyly, have been traced back over 700 years in one family, yet from the study of human embryonic material it has been estimated that only about 1 case in 20 of deformities of the extremities have any family history (Harris[24]). It has been shown above that the evidence for the familial incidence of anencephaly is scanty, but an enquiry into the incidence of other malformations, particularly of the nervous system (as in our case), among relatives of anencephalics may yield interesting results. With regard to the related spina bifida, Penrose[10] describes a number of cases in a family. It is also of interest that non-closure of the neural tube may be due to abnormality of the underlying mesoderm which in other cases may give rise to the Klippel-Feil syndrome and other vertebral malformations known to be hereditary (Boyd'[9]).

(3) *Racial incidence.* Murphy[5] points out that the incidence of malformations is significantly higher among the white population than among negroes (5.72 per 1,000 as opposed to 3.17 per 1,000). While this suggests heredity as an aetiological factor, there must also be considerable environmental differences in the two races. Figures for anencephaly are not available.

(4) *Sex incidence.* A number of malformations are commoner in one sex than in

the other. In anencephaly, the majority of affected foetuses are female. For instance, Ballantyne[2] had 30 female and 10 male cases, Malpas[9] had 31 females to 13 males, Murphy[4] 74 females to 27 males, and Angevine[25] 13 females to 6 males. This again suggests a hereditary cause. Possibly the sex chromosomes may be deranged (Penrose[23]). But an environmental reason, e.g. foetal endocrine derangement, though less likely, cannot be excluded.[25]

Now let us turn to the suggested *environmental factors* in the aetiology of these malformations.

(1) *Maternal age*. In a number of congenital defects, including the gross malformations of the nervous system, there is a definite association between maternal age and the incidence of the deformities. For malformations in general, Murphy[26] found in a series of 466 mothers with at least one normal and one defective child that the average age at marriage was 21.1 years, at the birth of the first normal child 23 years, and at the birth of the first defective child 28.4 years.

He found the proportion of defective to normal offspring:

(*a*) lowest when the mothers were between 20 and 25 years of age, (*b*) more or less constant when the mothers were between 25 and 30, (*c*) increasing from year to year when the mother had passed 30, (*d*) greatest after the mother had passed 40 years of age, at which time the ratio of defective to normally developed children was approximately three or more times that noted before the mothers were 30 years old. As regards malformations of the nervous system, Malpas[8] found that anencephalus and hydrocephalus were more frequent in the later maternal age-groups, and Penrose[10] confirmed this and also noted it with spina bifida. For instance, in anencephaly Malpas found the incidence 10 times greater in the maternal age group 46 to 50 than in the age group 16 to 20. Here then is an environmental factor with a definite relation to the incidence of anencephaly and other malformations.

(2) *Birth order*. Murphy and Mazer[27] found that the first 4 children in a family are less likely to exhibit congenital deformities than subsequent offspring. It is, however, difficult to separate this factor of birth order from that of maternal age which is correlated with it, and Malpas at least does not consider it a significant factor in anencephaly or spina bifida.

There are a number of other environmental factors which have at times been claimed to have a bearing on the incidence of malformations. Such are the "maternal impressions" of the older writers, trauma and pressure applied to the foetus, maternal disease, paternal disease, previous atypical maternal menstruation, maternal diet, etc. None of these have stood the test of searching enquiry. Nor was parental age difference found to be of any significance (Murphy[28]).

The possibility that such factors as, say, abnormalities of maternal blood, faulty implantation of the ovum and disease of the chorion or other foetal parts could cause some of the gross deformities such as anencephaly, has not been ruled out but there is no evidence for them.

The experimental production of deformities by interference with the development of normal ova must be mentioned briefly. Nearly all human malformations can be imitated artificially. Anencephaly or spina bifida have been produced by a variety of agents preventing the closure of the neural tube in frogs, e.g. chemicals (Hertwig,[29] Morgan[21]) and ultraviolet light (Baldwin[30]). Lately, Snell and Picken[31] have reported on a strain of mice derived from a single male, the father of which was exposed to X-rays. This strain contained

4.6 per cent of abnormal embryos in which the neural groove had failed to close throughout a portion of its anterior end. Although such experiments may help to elucidate problems of embryology and heredity it is not suggested that similar environmental factors normally come into play in human defects.

Finally, there are some *factors of doubtful significance* which may be interpreted as being indicative of either hereditary or environmental aetiology:

(1) *Relative sterility before birth of malformed child.* Murphy[5] showed that long periods of relative sterility occurred 4 times more often immediately before the conception of a malformed offspring than before the births of normal siblings.

(2) *Birth order of miscarriages, premature births and stillbirths.* According to Murphy,[5] unsuccessful pregnancies occur before and after the birth of malformed offspring more often than preceding and following the births of normally developed brothers and sisters.

(3) *Incidence of abortions and stillbirths in siblings of malformed children.* In the case of anencephaly, Malpas[3] found that fraternities in which an anencephalus occurred contained a higher proportion of abortions than was found for the total population, 12 per cent as opposed to 6 per cent. He also found the incidence of stillbirths and neonatal deaths abnormally high among the siblings of cases of spina bifida.

These three facts are evidence of what Murphy calls "reproductive inefficiency." He considers that as, in very many cases, they operated over a period of years, they were likely to originate in germ-cell defects rather than abnormalities in the environment. But this must remain problematical, and even if they were due to germ-cell changes these might be due to environmental or hereditary causes.

(4) *Amniotic deformities.* Ever since the days of Ahlfeld[32] amniotic deformities, especially adhesions, or pressure due to defective development, have been thought by some to play a part in the pathogenesis of at least a portion of cases of anencephaly. From an aetiological point of view this is immaterial, since the amniotic deformities themselves might either be hereditary or acquired.

Conclusion. The recurrence of malformations in siblings, sex and racial incidence are strongly suggestive of a hereditary causation, but only family incidence is real proof, and unfortunately the evidence for this is scanty in anencephaly. Among the environmental factors, maternal age appears to be the only one of proven significance. Hence, although definite proof is lacking, it may be assumed in the present state of our knowledge that anencephaly and similar malformations probably have an hereditary basis varied by maternal age and possibly by other environmental factors. In the case of spina bifida, Penrose[23] thought the simplest explanation was that the deformity was due to a partially dominant gene whose variable expression was connected with maternal age. This may also apply to anencephaly and could be brought into line with the genetic experiments of Snell and Picken[31] in mice. In addition, there is presumably an hereditary association between anencephaly and other congenital malformations, particularly of the nervous system.

SUMMARY.

A case of recurrent anencephaly with a family history of spina bifida is reported. The incidence of recurrent anencephaly is estimated, and similar cases are quoted from the literature.

The further prognosis is discussed. The aetiology of anencephaly and other con-

genital malformations is reviewed in this connexion.

We wish to thank Dr. J. C. A. Norman and Mr. S. Gordon Luker for their kind permission to publish this case. Our thanks are also due to Mr. Wilson Clyne, Obstetric Registrar to the Charing Cross Hospital, for notes concerning the patient's first pregnancy, and to Dr. Paul Cave for his report on the radiological findings.

REFERENCES.

1. Murphy, D. P *Surg., Gynecol. Obstet.*, 1936, lxiii, 443.
2. Ballantyne, J. W. "Manual of Antenatal Path. and Hyg." Vol. II. "The Embryo" (Wm. Green & Sons, Edinburgh), 1904, pp. 332-350.
3. Malpas, P. *Journ. Obstet. and Gynaecol. Brit. Emp.*, 1937, xliv, 434.
4. Murphy, D. P. *Journ. Amer. Med. Assoc.*, 1936, cvi, 457.
5. Murphy, D. P. *Amer. Journ. Obstet. and Gynecol.*, 1937, xxxiv, 890.
6. Kermauner. In E. Schwalbe's "*Morphologie der Missbildungen,*" 1909, part 3, section I, pp. 86–101.
7. Ballantyne, J. W. *Trans. Edin. Obstet. Soc.*, 1899, xxiv, 16.
8. Lammert, G. *Arch. f. path. Anat.*, 1861, xxii, 230.
9. Malpas, P. *Journ. Obstet. and Gynaecol. Brit. Emp.*, 1933, xl, 1046.
10. Penrose, L. S. *Journ. Ment. Sci.*, 1939, lxxxv, 1141.
11. Küstner. In Müller's "*Handbuch der Geburtshülfe,*" 1888, Vol. II.
12. Birnbaum, R. "Clinical Manual of Malformations and Congenital Diseases of the Foetus." Translated and annotated by G. Blacker. (Churchill), 1912, pp. 29-44.
13. Martin, J. *Med. Exam., Philadelphia.*, 1840, v. 23.
14. Carli. *Bull. d. sc. med. di Bologna.*, 1863, xix, 30.
15. Bruneel. *Ann. Soc. méd-chir. de Bruges*, 1854, ii, 73.
16. Otto. *Monstrorum Sexcentorum Descriptio, obs.*, 1841, xlix, 32.
17. Josephson, J. E. and K. B. Waller. *Canad. Med. Assoc. Journ.*, 1933, xxxix, 1.
18. De Vries, E. *Psych. Neurol. Bladen*, 1915, I.
19. Boyd, J. D. "Experimental Embryology and Anencephaly." Suppl. to *London Hosp. Gaz.*, 1942, xlv, No. 3.
20. Morgan, T. H. "Experimental Embryology," New York, 1927.
21. Morgan, T. H. *Anat. Anz.*, 1894, ix, 699.
22. Ballantyne, J. W. *Amer. Journ. Obstet. and Dis. Women and Children*, 1900, xli, 577.
23. Penrose, L. S. *Journ. Ment. Sci.*, 1938, lxxxiv, 693.
24. Harris, H. A. In C. P. Blacker's "Chances of Morbid Inheritance" (Lewis), 1934, p. 386.
25. Angevine, D. Murray. *Arch. Path.*, 1938, xxvi, 507.
26. Murphy, D. P. *Amer. Journ. Dis. Children*, 1936, li, 1007.
27. Murphy, D. P. and M. Mazer. *Journ. Amer. Med. Assoc.*, 1935, cv, 849.
28. Murphy, D. P. *Amer. Journ. Obstet. and Gynecol.*, 1936, xxxii, 873.
29. Hertwig, O. *Arch. f. mikr. Anat.*, 1895, xliv, 285.
30. Baldwin, W. M. *Anat. Rec.*, 1915, ix, 366.
31. Snell, G. D. and D. I. Picken. *Journ. Genetics*, 1935, xxxi, 213.
32. Ahlfeld. Quoted by R. Birnbaum. 1880.
33. Dorland, W. A. N. "American Illustrated Medical Dictionary," 1941, 19th ed. (Saunders).

Separation of the Symphysis Pubis During Delivery by the Forceps

BY

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RUPTURE of any part of the pelvic girdle during labour is a serious accident which carries with it a high mortality. If recovery follows, it is likely to be tedious, and often some permanent disability remains. De Lee[1] has stated that when the rupture occurs at the symphysis pubis, owing to possible communication with the vagina and the added danger of sepsis, the mortality is approximately 35 per cent. This is nearly as high as it is for rupture of the uterus, and it may therefore be considered as a major obstetric calamity.

The following case is reported because it illustrates a not uncommon sequence of events leading to a difficult delivery. During this delivery separation of the symphysis occurred. It also illustrates the difficulty of nursing a case of pelvic injury through the puerperium, and the prolonged after-treatment that is necessary.

CLINICAL HISTORY.

The patient was a young Polish refugee aged 28 years. She was a primipara, evacuated from London to an emergency maternity home at Stagenhoe Park, Hertfordshire.

As is customary under the evacuation scheme she arrived shortly before the expected date of labour, bringing with her the antenatal notes of her case. The expected date of delivery was given as December 13th, 1943. Her pelvic measurements were: Interspinous 9 inches, intercristal 10½ inches, external conjugate 7½ inches. The outlet was not described. The last entry on the card stated that the foetus was in the left occipito-posterior position and that the head would engage on pressure. Disproportion was not suggested, and it was arranged for her to remain in a billet near the maternity home and to be admitted at the onset of labour as a normal case.

FIRST STAGE OF LABOUR.

She was admitted to the maternity home a week before the expected date with ruptured membranes and vague pains. After 48 hours of moderate but irregular contractions, the head, which was still in the left occipito-posterior position, had passed through the brim of the pelvis. On rectal examination the cervix was 1/5 dilated and she was quite comfortable.

When first seen on the 3rd day for slow progress, contractions were fairly strong but were infrequent. She had been given chloral and bromide and had slept at intervals. The maternal pulse-rate was 80 and the foetal heart 140. Liquor amnii was draining freely. A vaginal examination was made and the head was in the pelvic cavity with the occiput in the left occipito-posterior position. The cervix was 2/5 dilated. The outlet appeared to be slightly contracted, but it was thought that if the inertia could be overcome the head would mould sufficiently to permit vaginal delivery. An expectant policy was therefore decided upon until full dilatation could be reached. She was given an injection of 1/4 grain of morphine and she slept well that night.

On the 4th day of labour contractions were still irregular and it was necessary to pass a catheter 8-hourly. The liquor was meconium-stained and slightly offensive. The foetal heart-rate was 150. The maternal pulse-rate was now 100 and she was becoming more distressed. The uterus, although relaxing between the contractions, was now plainly showing the contours of the foetus. The cervix

was only 1/2 dilated. Morphine was repeated that night.

On the 5th day inertia was still marked. The maternal pulse-rate had risen to 140. Glucose and fluids were taken well, but the vagina was dry and her general condition had greatly deteriorated. The uterus was extremely tense, and although contractions could be felt, there was obvious failure of relaxation between the pains.

In spite of the fact that the cervix was barely 3/4 dilated, it was clear that delivery could no longer be delayed, and it was decided that the vaginal route was probably the least dangerous.

Delivery by the Forceps.

In order to reduce the irritability of the uterus and to prepare for the anaesthetic, 1/4 grain of morphine and 1/100 grain of atropine was given by hypodermic injection. To anticipate shock, an intravenous plasma drip was started. Half an hour later, anaesthesia was induced with open ether, and the cervix was dilated manually with the patient in the lithotomy position. The shock resulting from this manoeuvre caused cessation of breathing and the pulse became barely perceptible. Some anxious moments were spent giving artificial respiration, but she recovered and after a short time the anaesthetic proceeded. It seemed impossible that the foetus could survive, but as the foetal heart-rate was still audible at 170, it was decided to attempt manual rotation and extraction by the forceps before perforating the head.

The patient's condition was most unsatisfactory, and the head was turned with great difficulty from the left occipito-posterior position where it had remained throughout labour. When the occiput was anterior the forceps were easily applied to the head, which was then in the mid-cavity of the pelvis. The head had previously been low in the pelvis but it was pushed up slightly during the rotation.

After several attempts at traction in a downward direction, a loud crack was heard, and this was followed by a very easy delivery of the head without even a vaginal laceration. The remainder of the delivery was completed, and the child, although suffering from shock, began to breathe almost immediately. The placenta followed and there was only a moderate loss. A rapid inspection of the cervix was carried out and there was a laceration about 1 inch long on the left side. As the maternal pulse-rate was now 150 it was thought inadvisable to attempt a repair. The plasma transfusion was replaced with whole blood and during the night her condition steadily improved.

The child, which weighed 7 pounds 12 ounces, was given a single injection of 5 mg. of vitamin K, and continued to make progress.

Puerperium.

The day after delivery the patient seemed surprisingly comfortable. Her temperature was 101°F, but her pulse had fallen to 120. She did not complain of any pain.

It had, of course, been realized that some injury had been caused to the pelvis, for the unforgettable sound of cracking bone could not be otherwise explained. But the problem of nursing, with the probability of infection, had to be faced. It was thought that proper drainage of the lochia was the first consideration. A tight binder was placed around the pelvis, and she was raised into the Fowler position. A course of sulphapyridine was started, and she remained thus for 5 days, during which time her temperature fell to normal. Her general condition steadily improved although her pulse-rate remained at about 115. She passed urine normally and the bowels acted. She still did not complain of pain in the pelvis.

No immediate attempt was made to locate the site of the injury. It did not appear advisable to remove the patient to hospital at this stage, and X-ray examination was not available.

On the morning of the 6th day, she suddenly complained of very severe pain in the right hip, radiating into the groin, and aggravated by movement of the right leg. There was tenderness over the right sacro-iliac joint, and she felt more comfortable lying flat. She was not allowed to do so however, for the lochia was now very offensive. A vaginal swab was taken for bacteriological examination, and this revealed a growth of anaerobic streptococci and Bacillus coli. Her blood count report was: Red cells, 2,900,000 per c.mm. and Haemoglobin, 52 per cent. After careful cross-grouping, a further 500 c.c. of blood was given without reaction and with marked improvement in her general condition.

On the 14th day of the puerperium some oedema

of the right labia was noticed, and this persisted for about 10 days, after which all signs of infection subsided. She was now allowed to lie flat with the binder around the pelvis. Pain in the right hip was still severe on movement, but by the 27th day her general condition was so satisfactory that it was decided to move her to the North Herts and South Beds Hospital.

Progress in Hospital.

An X-ray was taken on admission, and this showed that the symphysis pubis had separated by a distance calculated to be about 1 inch. There was also a small flake of bone detached from the joint. (Fig. 1).

She was nursed flat with a tight binder around the pelvis and between sandbags for another 5 weeks. The binder was adjusted frequently in order to keep up a steady pressure, which it was hoped would assist in reducing the gap between the pubic bones.

Nine weeks after delivery she could sit up in bed without pain, and a portable X-ray photograph (unfortunately not clear enough for reproduction) showed a definite reduction in the gap. A light plaster girdle was now made, about 4 inches wide, to fit between the crest of the ilium and the great trochanter. This was divided so that it could be detached when necessary, and massage and movements of the legs were started. She was able to stand alone wearing the plaster girdle 10 weeks after delivery. After 12 weeks she could walk slowly by herself. The plaster, which had never been comfortable, was now discarded, and she was fitted with a sacro-iliac belt. After 16 weeks she was able to walk half a mile without pain, and an X-ray now showed that the gap between the pubic bones was much less and the joint was more defined (Fig. 2).

The patient was finally discharged from hospital 18 weeks after delivery. Her general health was excellent. A pelvic examination showed a normal uterus without fixation and the torn cervix was practically healed. Menstruation had returned and there was no vaginal discharge. Micturition was normal, and no irregularity could be felt in the region of the symphysis. The child had put on weight and was very well. Six months after delivery a letter was received from the patient stating that she was living a normal life and walking almost without any difficulty. The baby weighed over 16 pounds and was said to be in excellent health.

There is no doubt that she fully deserved such a fortunate ending to a painful and tedious illness which she had borne throughout with such fortitude.

Commentary.

It will be clear from the X-rays (Figs. 1 and 2) that the cause of difficulty in this case was that the pelvis was of the justo minor, or small gynecoid type, unrecognized until labour was well advanced and confirmed only in the puerperium when radiology was available. Early rupture of the membranes, inefficient uterine action and slow dilatation of the cervix was the sequence of events leading to impending tonic contraction of the uterus and maternal exhaustion before full dilatation.

When delivery could no longer be postponed, manual dilatation and perforation of the head appeared to be the least dangerous method. It was only because the foetus was alive that delivery by the forceps was first attempted.

De Lee has stated that the force required to disrupt the pelvic girdle is between 400–2,600 pounds, and that in cases in which separation of the symphysis occurs there must be some inherent weakness of the joint. He also points out that pelvic contraction of the justo minor variety is a pre-

disposing cause, and that 67 per cent of reported cases have been caused by delivery with the forceps. It is difficult to judge the force used in the case reported above. It was considerable, but did not appear to be excessive, and the fact that the foetus survived the delivery corroborates this.

It is pointed out by Munro Kerr[2] that this type of dystocia may be treated by symphysiotomy, but as this is in effect what actually happened, it is doubtful if the convalescence would have been any shorter had this been performed. It might even have been longer. By the time that the need for symphysiotomy could have been recognized a change of plan and further delay might have been disastrous, for the patient's condition after the manual dilatation of the cervix made it imperative to complete the delivery in the shortest possible time. The ease of delivery which is described after symphysiotomy was most marked in this case after the separation had occurred.

It is significant that most of her pain was referred to the right sacro-iliac joint, and this must have represented the hinge upon which the widening of the pelvis occurred. In spite of the obviously distorted appearance of the symphysis in the X-ray photographs, the prognosis depends far more upon the less obvious injury to the sacro-iliac joint. It is probable in this case that the anterior ligaments of the sacro-iliac joint were not completely ruptured, although they must have been severely strained. Had the disorganization of the joint been complete, there would undoubtedly have been great permanent disability.

With regard to the separation of the symphysis, the best initial treatment would appear to be an adjustable strap which can be frequently tightened to exert pressure upon the sides of the pelvis. If it is logical to treat a fracture with overlap by continuous extension, it is also logical to treat a separation by continuous pressure, and this cannot be obtained by a rigid plaster. A plaster was only applied in this case after reduction of the gap had been demonstrated by an X-ray.

The question of future pregnancy will have to be considered. If the symphysis does not separate again during a subsequent pregnancy, and if cephalopelvimetry demonstrates that permanent enlargement of the pelvis has occurred, it is possible that she might have a natural labour. But if there is any suspicion of disproportion, Caesarean section would be the wiser course. Had a lateral X-ray of the pelvis been available in this case, and if a full clinical examination of the outlet had been made, no doubt the true state of affairs would have been appreciated, and arrangements could have been made for her to have a trial labour in a maternity hospital. A lower segment operation could then have been performed not later than the 3rd day of labour.

I should like to emphasize the fact that this patient was delivered and nursed throughout the most difficult part of the puerperium at Stagenhoe Park Emergency Maternity Home, which is 5 miles from medical aid. During this period she was cared for most patiently and skilfully by the Nursing Staff, and great credit is due to them for her recovery.

I am also indebted to Mr. E. G. Slesinger for his helpful advice concerning the pelvic injury, and to Dr. J. L. Dunlop, County Medical Officer of Hertfordshire, for permission to publish this case.

References.

1. De Lee. "Principles and Practice of Obstetrics," 1943, lvii, 792.
2. Munro Kerr. "Operative Obstetrics," 1939, xxv, 477.

FIG. 1.

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FIG. 2.

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A Case of Rupture of the Marginal Sinus of the Placenta

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HISTORY.

MRS. S., 24 years. Primipara, L.M.P. September 28, 1943. E.D.D. July 5, 1944.

Uneventful pregnancy until the 34th week when a transverse lie was corrected to a vertex presentation. Subsequent weekly examinations showed that the head had not entered the brim although no difficulty was experienced in pressing the head into the pelvic cavity. External and internal measurements did not reveal any abnormality and the blood-pressure and urine examinations were normal

Labour started at midnight of July 4–5th. Two capsules of Seconal were given and the 1st stage appeared to be proceeding normally. At 6.30 a.m., Mrs. S. became collapsed and passed a large clot—very much the "cloate like a pancake" mentioned by Munro Kerr. The clot was thick and represented about 20 ounces of blood.

Examination at 6.45 a.m. showed a thready pulse of 120, a low blood-pressure, with pallor and rapid respiration. The uterus was tender on the right side where it also appeared full, causing the symmetry of the organ to be lost. Palpation was difficult although the uterus was by no means tense.

The head was felt to be engaged. The foetal heart was not heard. Rectal examination revealed a cervix two fingers dilated with a vertex closely applied to it. It was decided to move the patient into an operating theatre in hospital before making a vaginal examination. Morphia was given before removal. During this process several smaller clots and a continuous dribble of blood appeared. At 7.45 a.m. a vaginal examination was made revealing that the cervix was nearly fully dilated, that the membranes had ruptured, and that the head was on the pelvic floor. Placenta was not felt. As the head came on to the perineum external bleeding ceased and it was noted that an increase in size of the fundus was not taking place. The pulse-rate remained fairly steady at 112. A little delay took place when the head was on the perineum and 0.25 c.cm. of pitocin was given twice. A 6½ pound stillborn female infant was delivered at 8.40 a.m. Some bloodstained liquor amnii followed and 3 minutes later the placenta and membranes, together with further clots, were spontaneously expelled. Ergometrine was given intravenously and intramuscularly.

Preparations for transfusion had been made and 600 c.cm. of blood were given in 15 minutes followed by 500 c.cm. of more slowly given plasma and finally a slow drip of 1 litre of glucose saline.

The general condition improved swiftly and the fundus was well retracted.

EXAMINATION OF THE PLACENTA.

The placenta and membranes were complete and the umbilical cord was centrally placed. The point of rupture of the mem-

branes was diametrically opposite to the placenta, thus indicating fundal implantation. A large clot—about 10 ounces—was present between the chorion and the amnion. This clot extended from the margin of the placenta to the torn edge of the membranes and covered an area roughly similar to the original clot.

There was no clot between the amnion and the placenta. The haemorrhage, therefore, had come from the marginal sinus.

Puerperium. For the first few days marked tenderness was present on the right side of the fundus. This gradually diminished and had disappeared by the 6th day.

Discussion. In all cases of antepartum haemorrhage accurate diagnosis should precede treatment. A low lying placenta had already been considered in this case as a possible explanation of the slow fixation of the head in the brim. Vaginal examination proved the absence of placenta praevia. Accidental haemorrhage was diagnosed. Toxaemic signs had not been present at any time but this was not considered to rule out the diagnosis.

The haemorrhage was partly concealed and this feature was associated with the fullness on the right side of the uterus and with the right-sided tenderness of the uterus in the early days of the puerperium.

Although no precise point of rupture could be identified as the source of the clot at the margin of the placenta it was considered that the haemorrhage was too profuse to have come from any source other than the marginal sinus.

This view was supported by the complete absence of any sign of haemorrhage from placental tissue or its adjacent maternal sinuses or from any of the large vessels coursing over the subamniotic placental surface.

An Unusual Case of Obstructed Labour Due to the Umbilical Cord

BY

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MRS. M.M., age 25, was first seen at the Antenatal Clinic of an E.M.S. Hospital on 6th January, 1944. She was due for labour on 15th April. Her measurements were on the large side.

Interspinous - - -	25 cm.
Intercristal - - -	30 cm.
Ext. conjugate - -	22 cm.
Interischial - - -	10 cm.
Subpubic arch wide	

She was 5 feet 5½ inches in height, and well built, about 11 stone in weight and otherwise in normal health. On 10th February it was noticed that the presentation was a right sacro posterior. X-rays confirmed this. There was little liquor amnii, the child was large and manipulation appeared to have little, if any, effect in changing the position, though occasionally the position was right sacro transverse rather than right sacro posterior. It was decided to allow her to go into labour with the breech presentation.

On 17th April the patient was admitted in the early morning complaining of a few pains. During the morning she developed a show and the pains were good but not severe. After 24 hours there had been no progress, and although the pains were good the breech had not descended into the pelvis. The patient was getting tired. The liquor amnii had not come away.

On 18th April a classical Caesarean section was performed. The presenting part was still above the brim. On opening the uterus it was found difficult to deliver the child. Finally it was extracted by the breech but the act put the cord on such a stretch that pulsation ceased. It was cut and the child, which weighed 8½ pounds, was revived easily. The cause of the trouble was then apparent. The cord, which measured 18 inches in length, passed from the umbilicus under the right arm, over the right shoulder, crossed the front of the neck, passed over the left shoulder, under the left arm, and then directly across the body to the placenta, which was situated well up on the right postero-lateral part of the uterus. The child was thus fixed by a sling *in utero*, and this accounted both for the failure to descend, and for the apparent difficulty of moving the child *in utero*.

The mother and child have both done well. It is a little difficult to forecast what would have happened in this case if it had been left alone. Delivery by the vagina would have been impossible unless the cord had given way and in due time the uterus might have ruptured.

Double Monster

BY

G. J. HIMONIDES,

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I WAS called on the 10th June, 1943, to attend a woman, M.M., from a village in the Paphos District, who had been in labour for 3 days, but the pains had stopped 8 hours previously. The woman was a primigravida in the 9th month of pregnancy.

Family history.

The following members of the husband's family had borne binovular twins, in each case one male and one female.

1. His grandmother.
2. The wife of one of his brothers had an abortion, in the 4th month.
3. One of his sisters had a premature birth.
4. One of his neices.

Abdominal Examination: Abdomen greatly swollen by a large quantity of liquor amnii. The head of the foetus was engaged in the pelvis. Foetal heart sounds were not audible. Pelvic measurements were normal.

Vaginal examination: The cervix of the uterus was fully dilated, and the membranes were not ruptured. I ruptured the membranes artificially and further examination of the presenting part revealed two heads fitting tightly in the cavity of the pelvis. I also felt two foreheads as far as the noses.

Treatment: At first I tried to deliver the child by version; this was, however, impossible, as the leading head was fitted tightly into the cavity of the pelvis. I then used the forceps and got hold of both heads simultaneously, brought them down from the cavity of the pelvis to its outlet, withdrew the forceps and after pressing one of the heads backwards and to the side, I delivered one head after the other. The body followed the heads normally; the placenta was normal and single.

Examination of the foetus: The foetus was a stillborn male and presented the following characteristics:

External: It bore two heads fused at the lower temporal and occipital region on a single neck. Two faces completely formed and similar in appearance differing only in that the left one presented a hare-lip and cleft-palate and a fistula on the lower jaw. The trunk and limbs were normal. (Figs. 1 and 2.) The foetus weighed 5 pounds; the length of the body was 17 inches; the diameters of both skulls together were, in inches, verticomental $9\frac{1}{2}$, suboccipito-frontal $8\frac{1}{2}$, occipito-frontal 9, suboccipito-bregmatic 8, bi-parietal 9, bi-temporal 8, bi-mastoid $8\frac{1}{2}$.

Internal: On opening the body it was found that the two separate cavities of the skull were joined at the occipital region by a bony tissue and at the temporal region by membrane. Each skull cavity contained a completely formed brain, the brains joining each other at the medulla to a common spinal cord. Union of the two medullae took place at a single hole in the centre of

FIG. 1.

Dicephalous Monster. Front view.

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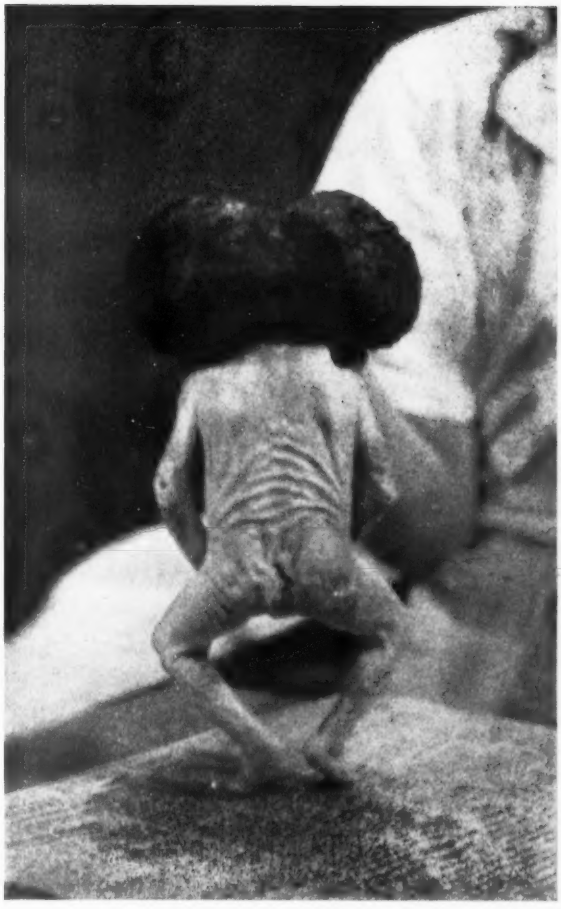

FIG. 2.

Dicephalous Monster. Back view.

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the diaphragm which separated the skulls. In the neck there were two larynxes and two pharynxes joining to form a common one. As well the arteries, veins and nerves of the two heads joined into common ones. The viscera of the thorax and the abdomen were normal with the exception of the heart which was larger than normal.

Conclusions.

1. Anatomically the above described foetus is a dicephalous monauchenous monster belonging to the category of cephalopagous incomplete double monsters and having this characteristic, that the two heads are not separate from each other, but are fused at the occipital and lower temporal region.

2. This case is of interest in view of the family history of binovular twinning and because of the hare-lip and cleft palate present in one face only. According to Feldman[1] only one similar case has been recorded and this unilateral defect is in keeping with the frequently observed fact that the components of a conjoined pair do not have the close facial resemblance of uniovular twins, although the etiology—incomplete separation of blastomeres—is generally thought to be the same in both cases.

My thanks are due to the Director of Medical Services, Cyprus, for permission to publish this case.

REFERENCE.

1. Feldman, W. M. *British Encyclopaedia of Medical Practice*, 1937, v, 377.

Atresia of Oesophagus and Imperforate Anus Communicating with the Bladder

BY

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THE incidence of imperforate anus is probably 1 in 5,000, that of atresia of oesophagus 1 in about 50,000 births. Curiously enough, I saw 3 cases of atresia of the oesophagus in 6 months, including this case. One was similarly associated with imperforate anus, the other with various other congenital defects.

Either of these abnormalities is often found to be associated with other congenital malformations, such as spina bifida, absence of kidney, club-foot, and so on, but it is of special interest to note that in about 30 per cent of cases of atresia of oesophagus an imperforate anus or atresia of rectum is present, due to arrest or abnormality of development at each end of the primitive gut arising during the 7th or 8th week of embryonic life.

A fistulous communication between rectum and urinary tract exists if the urorectal septum does not completely separate the rectum from the urogenital sinus. A cloacal duct is then established between bladder or urethra and the hind-gut. Whereas this type of anomaly is easy to understand, the etiology of the tracheo-oesophageal fistula is still in dispute. But one fact strikes one on studying reports and pictures of congenital atresia of the oesophagus—although the oesophagus and the trachea are derived from the same solid cord, in all types of anomaly it is the trachea which is well formed in its whole length, the oesophagus showing all kinds of abnormalities as clearly shown in the accompanying photograph.

In our case the mother was a primipara, 22 years old, and there was nothing significant in her antenatal history. The only noteworthy feature was a terminal hydramnios, a condition frequently observed by various authors in congenital atresia of oesophagus. Whether this hydramnios is due to the foetus not being able to swallow the amniotic fluid, is a vexed question.

The child, a full-time male, was delivered on Christmas Eve by the forceps because of delay in the 2nd stage. Its weight was 8 pounds 4 ounces, and it was an apparently healthy and normal baby who cried well after cleaning of the upper air passages. He took his feeds well and did not show any signs of an obstruction of the upper end of the alimentary tract, but was found to be passing urine and meconium *per urethram* and to have no anal orifice, but only a dimple. There seemed no immediate urgency for surgical interference because the intestinal content was escaping without difficulty. The next day, however, i.e., 2 days after birth, the abdomen was distended and slightly tympanitic. An iliac colostomy was performed and the gut found distended and there was free fluid in the peritoneum.

The following day fluids given were regurgitated through the nose for the first time, while flatus was passed through the colostomy. The suspicion of an atresia of

E.F.

oesophagus arose although the baby had not for a relatively considerable length of time shown any typical signs of obstruction of the upper digestive tract, which I may be allowed to briefly summarize here as follows: A baby with an atresia of oesophagus takes his first few swallows normally (so filling the proximal segment of the oesophagus); very soon, however, reappearance of frothy mucus is noticed in the mouth and pharynx and repeated regurgitation after each new attempt at feeding, followed by spasmodic coughing and cyanosis.

Simple methods for making a diagnosis are:

(1) Passing of a soft catheter into the oesophagus to the point of apparent obstruction, usually at the level of the 4th or 5th dorsal vertebrae.

(2) Testing of the vomit for lack of hydrochloric acid.

If hospital facilities are available, the diagnosis can be made by:

(1) X-ray, using lipiodol in preference to barium. Barium swallowed in large amounts lessens the chance of survival if ever surgical treatment should be successful, as it leads to fatal pneumonia.

(2) Injection of a few cubic centimetres of air through a soft catheter from a small bulb syringe. The X-ray will then show a cul-de-sac of the upper oesophageal segment. This technique can be recommended as there is no danger associated with it.

(3) Bronchoscopy, probably the best procedure. In our case we found the larynx and pharynx full of milky pus and very red. On passing a bronchoscope, a slit-like fold was seen passing backwards and to the left. This was probably a tracheo-oesophageal fistula.

The baby died on the 5th day. Such infants may live up to 12 days, dying from starvation and bronchopneumonia.

This case illustrates the commonest type: the upper segment of the oesophagus ends blindly and is dilated, the lower segment communicating with the trachea just above the left main bronchus. The lower oesophagus is also dilated. A fistula between trachea and the upper segment of the oesophagus is of rare occurrence.

As to the examination and diagnosis of an imperforate anus, it is important for the anomoly to be discovered as early as possible, but sometimes its presence is unsuspected until symptoms of obstruction occur, especially in cases of fistulae when the napkins have been stained with meconium passed *per urethram*. When flatus or meconium is expelled through the urethra, as in our case, the diagnosis of the presence of a fistula is easy. Occlusion of the rectum in the presence of an anus is easily discovered by digital examination. With regard to X-ray, it seems that an examination with barium has been accepted as a general procedure for an accurate diagnosis in all types of imperforate anus, as it helps to locate the lower end of the bowel. In addition, it will reveal the presence of an associated abnormality of a more serious nature, as in this case, in which it was unfortunately omitted. This fact is attributable to the condition being discovered on Christmas Day.

Some surgeons, however, object to a barium meal, insofar as they adhere to the orthodox rule of not giving anything by mouth in cases of obstruction, in which they include an imperforate anus. I would like to mention here that in 1930 a practical method was published by Wangensteen to show the terminal end of the rectum. An X-ray of abdomen and pelvis is taken 20 hours after birth, with the baby held upside down for a few seconds. The blind end of

the bowel can be clearly seen filled with gas which has accumulated in the lower bowel since birth. The disadvantage of this method is clear—it can only be used 20 hours after birth and it does not show any other abnormalities of the digestive tract.

The ideal treatment for all cases of imperforate anus is a proctoplasty, as it produces an anal opening in the normal location, and this operation should always be considered, if possible, especially if a cloaca is not present. Cases of communication between the rectum and the urinary tract are much more difficult to treat successfully, and even when an attempt is made at proctoplasty it appears from the literature that in quite a number of cases the operation has to be abandoned in favour of a colostomy. A colostomy is the treatment of choice in cases of imperforate anus with or without cloaca when the abdomen is distended, although the mortality is about 50 per cent. An attempt to close the fistula should not be made and the operation should be left for a few years unless obstruction calls for an earlier interference. In addition, there is a chance for the fistulous tract to close spontaneously after a colostomy or proctoplasty.

A last word about the function of the anal sphincter following a proctoplasty. Almost always the normal function of the anal sphincter gets lost. But the children learn to control their bowels by contracting the levator ani muscles and by voluntarily contracting their gluteal muscles.

As mentioned previously, we had a similar case about this time. The only difference is that there was no cloaca and a proctoplasty was made. The baby died the same day.*

I wish to thank Miss Gladys Hill, Senior Obstetric Surgeon at the Royal Free Hospital, under whose care the patient was admitted to the hospital, for permission to publish the case.

* Cases shown on April 21st, 1944, at the Royal Society of Medicine.

A Case of Acute Hydramnios Successfully Treated by Abdominal Paracentesis

BY

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TEXT books of Obstetrics in general give a very gloomy prognosis for the foetus in cases of acute hydramnios. One's interest in the condition, therefore, was aroused when, as is recorded below, a living child was delivered from a patient who developed acute hydramnios in the 19th week of her pregnancy.

Two distinct types of the condition are recognized:

(1) Acute hydramnios appearing suddenly in early pregnancy—primary acute hydramnios.

(2) Acute hydramnios developing late in pregnancy superimposed upon chronic hydramnios which has been present for some time—secondary acute hydramnios.

Since the primary type appears in early pregnancy the foetal prognosis is much worse than in the secondary variety which may develop after the child has become viable. Failure to differentiate between the two types has led to very wide variations in the recorded incidence and in the results reported by different observers, Thus Marshall[1] considers the condition extremely rare and the foetal prognosis practically hopeless, while Mukherjee,[2] who includes the secondary type, reports several personal cases terminating in the birth of living children.

The earliest cases reported are those of Marshall[1] and F. J. Browne[3] appearing at the 18th week of pregnancy, while the majority occur between the 20th and 28th weeks.

The aetiology is as obscure as that of the more common chronic hydramnios, but one feature is significant; the majority of cases occur in association with twin pregnancy of the uniovular type. The link between these two interesting conditions has never been satisfactorily explained, though it has been noted that frequently only one amniotic sac is affected.

The diagnosis of primary acute hydramnios is relatively simple as the condition makes its appearance early in pregnancy and soon gives rise to marked symptoms. Biological tests and radiographs are of assistance in excluding ovarian cyst and ascites. Goodwin[4] has noted a positive Zondek-Aschheim test with very dilute urine in several cases of acute hydramnios, the reaction being similar to that obtained in the presence of hydatidiform mole.

Browne[3] states that with acute hydramnios the distress is so great and the symptoms so urgent that there is usually no question of expectant treatment. He advises induction of labour by puncture of the membranes as soon as the diagnosis is made. This is undoubtedly the correct procedure when obvious foetal abnormalities exist, but there are cases with at least one normal foetus when more conservative measures may be employed.

Conservative treatment consists mainly in the removal of the excess amniotic fluid. Eden and Holland[5] suggest that this be carried out from below by means of a Drew Smythe catheter, but in our experience this is almost invariably followed sooner or later by the onset of labour.

The second method which we have used, and have seen used,[6] with success is that of removal of the fluid by abdominal puncture.

Various writers have pointed out the dangers of this procedure. Injury to the foetus with the puncturing needle has not occurred in a large number of cases at Queen Charlotte's Hospital and can be avoided easily by choosing a suitable site of entry for the needle. In several cases the child has been felt moving against the point of the instrument during the operation, yet injury was not visible at birth.

In a few cases the placenta was encountered and pure blood instead of liquor appeared. The needle was quickly withdrawn and reinserted in another site, and no ill effect resulted.

A careful aseptic technique is employed and infection has not followed the operation. Intestinal damage is most unlikely as bowel rarely lies in front of the greatly enlarged uterus.

The main objection however is that a certain percentage of patients go into labour after the completion of the operation. In many cases this may be avoided by pre-medication with morphine and hyoscine followed by milder sedatives for 12 hours after removal of the fluid. Should labour ensue in spite of these precautions, no great damage has been done, as most other methods of treatment start with this as their object.

Objection has further been raised on the ground that the benefit of abdominal paracentesis is short-lived and the uterus is rapidly distended again by more liquor amnii. This undoubtedly does occur and a second tapping may be necessary as early as 2 weeks after the first. We have found, however, that as pregnancy progresses repetition of the operation is required only at longer and longer intervals. Thus in the following case the intervals increased from 3 to 6 weeks, and a total of 38 pints of liquor were withdrawn.

Mrs. J. W., aged 25 years, a primigravida, first attended the antenatal clinic on 16th May, 1942, after 21 weeks amenorrhoea. She complained that her abdomen had become rapidly very large in the previous 2 weeks, and was now causing her considerable discomfort particularly when walking. Foetal movements had not been felt.

The blood-pressure was 100/60, not any abnormal contents were found in the urine, and the Wassermann reaction was negative. The uterus was enlarged to the level of the ensiform cartilage, and the circumference of the abdomen at the umbilicus was 36 inches. The foetal parts could not be felt and the foetal heart was not heard. Neither external nor internal ballottement could be elicited.

Radiographs of the abdomen were taken and on careful examination two foetal spines could be seen. A diagnosis was made of acute hydramnios associated with twins almost certainly of the uniovular type.

Difficulty was found in determining on the radiographs whether or not foetal deformity existed. It was therefore decided to remove as much liquor as possible and allow the pregnancy to continue until the foetuses were bigger and more satisfactory radiographs could be taken.

Seven pints of liquor were withdrawn using a lumbar puncture needle inserted through the abdominal wall, and attached with rubber tubing through a Winchester to a suction pump on the water tap. This

produced considerable decrease in the size of the abdomen and the fundus fell almost to the level of the umbilicus. The patient was discharged on the following morning feeling much more comfortable.

She returned at weekly intervals for examination and on 9th June, at 24 weeks, the fundus had again risen to the ensiform cartilage and she complained of breathlessness and abdominal discomfort. She was readmitted and as much liquor as possible withdrawn in exactly the same way. Nine pints were removed, and the following morning radiographs of the abdomen were taken. These were much clearer than previously and foetal abnormalities were not visible.

On 8th July, at 28½ weeks, gross hydramnios was again present and 11 pints of liquor were withdrawn. Uterine contractions were felt during the operation but the patient did not go into labour. Foetal parts could now be felt and heart sounds were heard.

On 18th August, at 34 weeks, the circumference of the abdomen was 43 inches, and 11 pints of liquor were again withdrawn.

Labour pains commenced at 6 p.m. on 28th August, i.e. at 36 weeks, and she was delivered 11 hours later of male twins, both presenting by the breech. The delivery was uncomplicated, but the first child, weighing 2 pounds 7 ounces, was stillborn, and showed early signs of maceration. The second child weighed 3 pounds 9 ounces and cried immediately after birth.

Examination of the afterbirth indicated that the twins were of the uniovular type. There was only one placenta with two cords and two amniotic sacs. The sacs were separated by two layers of smooth membrane only.

The puerperium was uneventful and mother and child were discharged 28 days after delivery, the infant weighing 5 pounds.

Summary.

(1) A case of acute hydramnios associated with uniovular twins is described.

(2) Treatment was by repeated abdominal paracentesis and a total of 38 pints of liquor amnii was withdrawn.

(3) One child was stillborn but the other, although premature, survived and gained weight.

(4) The advantages and dangers of this line of treatment are briefly discussed.

References.

1. Marshall, G. B. *Journ. Obstet. and Gynaecol., Brit. Emp.*, 1914, xxv, 201.
2. Mukherjee, C. L. *Calcutta Med. Journ.*, 1939, xxxv, 278. *Tr. M. Col. Re-union, Calcutta*, 1938, ii, 215.
3. Browne, F. J. "Antenatal and Postnatal Care," 1942, 4th ed., pp. 160-170. London: Churchill.
4. Goodwin, A. Personal communication.
5. Eden, T. W. and E. Holland. "Manual of Obstetrics," 1937, 8th ed., p. 166. London: Churchill.
6. Rivett, L. C. *Journ. Obstet. and Gynaecol. Brit. Emp.*, 1933, xl, 522.

Transposition of the Ovarian Veins

BY

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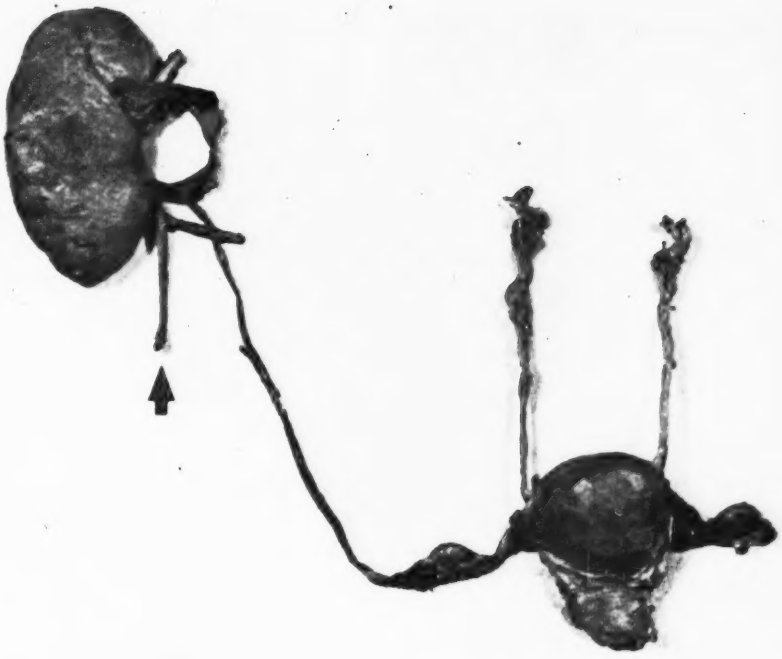
IN text books of Anatomy and Gynaecology the right ovarian vein is stated to enter the vena cava, and the left ovarian vein to enter the left renal vein.

These veins are long and frail, and in postmortem and anatomical dissections are apt to be torn or dragged from their origins or terminations, so that a proper study of their relations cannot be made.

I have found as the result of many careful dissections that in a very small percentage of cases there is a transposition of the ovarian venous termination, as seen in the photograph where the right ovarian vein enters the right renal vein. There is in this case an abnormal renal artery also which enters the lower pole of the kidney behind the transposed vein and the ureter. The ureter is marked with an arrow. For permission to publish this note I am indebted to Dr. R. Strom-Olsen, the Physician Superintendent, and for the photograph to Mr. T. C. Hall, M.S.R.



A.R.

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Some Curiosities of Mammalian Reproduction

Part 2.—Concerning the Life of the Sperm *

BY

FREDERIC WOOD JONES, M.B., D.Sc., F.R.S.

"The base of reproduction must be looked for not in the desire of the parents to reproduce but in the discontent of the germs with their surroundings inside those parents, and a desire on their part to have a separate maintenance."

SAMUEL BUTLER (1880). *Note Books.*

THE LIFE OF THE SPERM IN LOWER ANIMALS.

QUITE apart from its proverbial symbolism of industry and its unasking obedience to the social order of the hive, the bee has always been in favour with the curious because of the known or assumed peculiarities of its reproductive history. On the old belief that the queen bee was in reality a king and that bees were generated by a male parent there is no need to dwell. The real interest in the folklore of the reproductive story of the bees lies in the belief, apparently fostered in the first place by Aristotle, that bees, like some other insects "are not derived from living parentage, but are generated spontaneously." Thomas Nashe, in his *Pierce Pennilesse* (1592), elaborates this teaching of Aristotle by claiming that bees are born "*sine coitu*" (Robin, p. 24). This belief in the spontaneous, if not immaculate, origin of bees was widely held and as an extension of it there was the common acceptance of the thesis that bees were begot, not from parents who had mated in the ordinary way, but from some sort of natural fermentation or corruption. Probably it was Virgil who in the second half of his Fourth Georgic, gave wider currency to the belief that bees were generated from the decaying carcasses of oxen. Here comes to mind the story of Samson and the later refinement that bees were begot from decaying bulls and wasps of the putridity of dead horses (Nashe).

There was a mystery concerning the reproductive history of the bees. The mystery remained unsolved throughout the whole of the Middle Ages. George the Third was on the throne, William Pitt was Prime Minister, and the convicts were already on their way to Sydney before the mystery was solved. On a fine sunny day —June 29th, 1788—Francois Burens and his master, Francis Huber, witnessed at Pregney in Switzerland the wonderful nuptial flight of a virgin queen bee. Even then the whole of the mystery was not cleared away. The queen was indeed a queen, a fully functional female. She was mated during the mad whirling flight into the sky and her mate was a successful drone, destined to death in his accomplishment. But though the queen, on her return to the hive, may lay 2,000 eggs a day during the height of her activity, she still retains the power to lay something like 1,000,000 or 1,500,000 fertilized eggs during the rest of her life. Her life may last 5 years. It has been computed by different bee masters that during her nuptial flight she receives from 4 to 25,000,000 sperms. Some of these living sperms must be retained in her body and

* Lloyd Roberts Lecture—Part 2.

stored for, if her nuptial flight is her only mating, as it is commonly supposed to be, she must retain living sperms to fertilize the eggs she lays later in her life. Although her laying powers decrease as she grows older, it seems certain that her fertility persists for many years and that her fertility depends on the presence of the sperms with which she was impregnated when first she left the hive on the dramatic aereal excursion of her nuptial flight.

Strange though this may appear it is not out of harmony with what is known of the reproductive stories of other insects, for it is no abnormal thing to find that in them the life of the sperm, lodged in the internal reproductive passages of the female, is a very prolonged one. Nor is the phenomenon one that is unknown in other invertebrates. It would seem to be a very general condition that among invertebrates as a phylum, the male cell is capable of living for a long while after it has been shed by the male and that for long it retains its powers of effecting fertilization.

Nor is prolonged viability of the sperm cell confined to the invertebrates. It is well known that in many lower vertebrates there is provision for the storage of spermatozooa by the female. These stored spermatozooa are fully potent to fertilize eggs shed at many subsequent laying periods. The length of time during which the stored sperms retain their vitality and their fertilizing capacity may be a long one. Among reptiles the phenomenon is well known, for female snakes have produced living young or fertile eggs at long intervals after their capture and solitary confinement in menageries. In some reptilian orders the length of life of sperm is even more remarkable than it is in the case of the snakes. Hilderbrand confined 10 fully adult females of a species of Terrapin (*Malaclemmys centrata*) in a pen to which no male was ever admitted. These females all laid eggs, the eggs having been fertilized by impregnations effected previous to their isolation. A record was kept of the total number of eggs laid by all ten females every year and the proportion of those that were fertile was noted. The complete segregation of the females was maintained for four years. During the first year of isolation the 10 females between them laid 124 eggs. Of these 123, or 99.2 per cent, were fertile. In the second year they laid a total of 116 eggs and of these 102, or 96.6 per cent, were fertile. The 3rd year, the total number of eggs increased to 130, but the fertility decreased to 30 per cent. In the fourth year there were 108 eggs and only 4, or 3.7 per cent, were fertile. Obviously some sperms had lingered on, living and capable of effecting fertilization, for 4 years in the female reproductive passages of the Terrapins. To complete the experiment, Hilderbrand again introduced males at the end of the 4th year, and during the next year the females laid 145 eggs, 141 of which were fertile.

The same phenomena are known to occur among the Amphibia. Sedgwick has recorded the production of living young by a Salamander at least a year after separation from all companions.

With birds there are apparently no such spectacular instances of the long life of the sperm within the female genital passages; but it is well known that the domestic fowl will lay fertile eggs for 15 days or more after separation from the male, and with some birds the period is considerably longer.

Evidently the long life of the sperm and the capacity of the female to store the living sperm somewhere in the reproductive passages, is a widespread phenomenon. It occurs in invertebrates and vertebrates alike and appears to be present in all phyla below the rank of the mammals. The question then arises, are the mammals.

alone among living animals, handicapped in their reproductive processes by the short life span and the low vitality of their sex cells. According to the dictates of the more recent writers on the subject this is the creed to which we should give our acceptance: "The general conclusion is that the sperms of all mammals whose testes are enclosed in an external scrotum become infertile within 48 hours after they are exposed to the normal temperature of the female reproductive tract" (Solly Zuckerman, 1936, "The Physiology of Fertility in Man and Monkey." *Eugenics Review*, Vol. 28, No. 1, p. 49).

This is an unequivocal statement of a very fashionable thesis of which much has been heard during the last few years. Presumably the proviso "whose testes are enclosed in an external scrotum" is added because it would seem to be implicit in the thesis that "the normal temperature of the female reproductive tract" is the lethal factor that brings about the rapid death or infertility of the spermatozooa. Herein is involved another thesis, which has also become fashionable, that claims the reason for the descent of the testis to lie in the unfavourable conditions created by intra-abdominal temperature. The testis is supposed to find its way into the scrotum in order to obtain a cooler environment. Let us admit at once that this last assumption ranks no higher than a theory and that there are perhaps better theories to account for the descent of the testis. We must also admit that the assumption that the "normal temperature of the female reproductive tract" is lethal to the sperm is in no better case; and that in the face of what we know of the life of the sperm in invertebrates and lower vertebrates, it would seem to be a rash "general conclusion" that mammalian sperms become infertile within 48 hours after they are deposited in the female genital tract. It is therefore worth while to review some cases in which this lightly assumed general conclusion with regard to the mammals is seen to be wholly unjustified.

The Life of the Sperm in Certain Bats.

It is a rather humiliating fact that although bats are familiar animals and no less than a dozen species are embraced in the mammalian fauna of Great Britain, British zoologists have made singularly few contributions towards the study of what is perhaps the mammalian group that still affords the finest field for research into matters at present mysterious and unexplained. It is not that bats are rare animals. They are abundant in most localities, and moreover they have this great advantage among wild creatures that are available for study, that large numbers may commonly be found together and that specimens may be selected for examination without the necessity of the hazards of trapping or shooting individuals more or less by chance.

It is a strange fact that there is no species inhabiting the British Isles the specific identification of which was first correctly made by a British zoologist. Over a series of years our naturalists have wrongly identified and named several of our indigenous bats to the confusion of literature, but the definitive specific determination of all the British species rests on the work of continental zoologists. For the identification of even our commonest species we are indebted to workers on the continent of Europe. Daubenton in France and Leisler and Kuhl in Germany claim the honours in the field of taxonomy, and French naturalists were familiar with some of the most curious and intimate details of the life histories of bats more than a century before the knowledge became current in British zoological literature.

In particular, it was not until 1937 that

British zoologists had made any serious contributions to the story of the reproductive processes in bats. Beyond recording the sporadic production of young by females slowly starving to death in captivity, no interest seems to have been taken in the matter, and such meagre details as were recorded led to no understanding of the main problem. In 1834, Mr. G. Daniell recorded the birth of a young noctule on June 23rd, from a mother captured on May 16th, and thereby concluded that the period of gestation "exceeded 38 days." In 1907, Mr. A. Whitaker, from observations on captive pipistrells, concluded that it was "between 41 and 49 days." No hint as to the time of the mating season or of its relation to the time of parturition was ever made, and from the few isolated observations on the date of birth no general conclusions could possibly be arrived at. Continental naturalists had, however, known for long that though parturition occurs during the early months of summer, the mating season is confined to the autumn, at which time the testis of the male is enlarged and functional. Among the European zoologists who had made important contributions towards our knowledge of the reproductive history of the bats may be mentioned: Benecke in 1879; Fries 1879; Duval, 1879 and 1895; Benedin and Julin in 1880; Vogt, 1881 and 1882, and Robin in 1881. All these workers had paved the way for the great work of Rollinat and Trouessart in 1895 and 1897. The startling conclusions to which these two patient investigators came were sadly neglected by British students of mammalian reproduction, but they were at length made available to British zoologists in 1911 in the initial issues of Barrett Hamilton's *History of British Mammals*, a work that was unfortunately never completed. Rollinat and Trouessart carried on their investigations over many years. They had under their observation large cave colonies of bats readily accessible for study in the neighbourhood of Argentin in the Department of Indre. The species inhabiting these caves were the mouse-eared bat (*Myotis myosotis*), a vespertilionid species, and the three species of rhinolophid horse-shoe bats (*Rhinolophus ferrumequinum, R. hipposideros, R. euryale*). These investigators found colonies of *Myotis* that during the month of September contained both males and females living in company. The first striking fact noticed about these animals congregated at the approach of autumn was that, although the reproductive organs of the males were developed to their maximum and were functional, those of the females were in an undeveloped and quiescent stage. The females were all very fat, preparatory to the winter retreat, but the males showed no similar deposition of fat in their tissues. The next striking fact observed was that in March, when activity is being resumed, the females in the colonies showed rapid growth of the reproductive organs and enlargement of the ovaries and evidence of ovulation, but the reproductive glands of the males were involuting and becoming quiescent. Following the resumption of activity in March the mixed colonies split up and during the spring and summer months the females occupy retreats separate from the males. In these exclusively female colonies the young are produced during May or June.

These strange findings led to a more detailed research in the course of which it was discovered that the fat females with quiescent ovaries, entering on their period of inactivity in September, held large numbers of spermatozooa in the uterine cavities. These sperms had apparently found lodgment in the uteri following an act of coitus by the functionally active males towards the end of summer.

Next it was determined that within a few days of the resumption of activity in the month of March, ovulation occurs and fertilization of the ovum by one of the stored spermatozooa is effected. It would appear that, in the case of *Myotis*, some 7 weeks intervene between the vernal fertilization and parturition in May or June.

The reproductive history of the rhinolophid horse-shoe bats studied by Rollinat and Trouessart differs from that of *Myotis* only in details. The sexual glands of the male become active at the end of the summer and at that time the ovaries of the female are small and pale and quiescent. The earliest date on which spermatozooa were discovered in the female genital passages was October 5th. No females examined in September contained any sperms, the mating season being evidently somewhat later than that of *Myotis*. Moreover, there is a difference in the actual site of deposition of the sperm cells. During the mating season Rollinat and Trouessart noticed that the vagina of the females contained mucus. This mucus they considered to be a vaginal secretion, but there is abundant evidence that it is actually furnished by the male in the act of coitus. The secretion itself is derived from the greatly enlarged male accessory sexual glands, the large gland, known as the urethral gland, being probably its principal source. The mucus fills the whole of the vagina and after the pairing season the vagina becomes extremely dilated and the whole of its lumen is completely obliterated by a congealed mass. (See Fig. 16.) Apparently this "bouchon vaginal" was first described by Fries (1879) and it subsequently was noted by Vogt (1882) and Duval (1895). Its nature was fully determined by Rollinat and Trouessart (1895) and microphotographs of it have more recently been published by Harrison Matthews (1937). The bouchon itself consists of a plug of clear, hard, inspissated mucus having the consistency of soft cartilage. This plug has a softer, opaque, white central core, and this core is composed entirely of closely packed spermatozooa. The sperms are encapsuled, like flies in amber, in the midst of the plug of mucus and in that condition they remain throughout the winter, for the mucus mass deposited in October has become a hard plug by November.

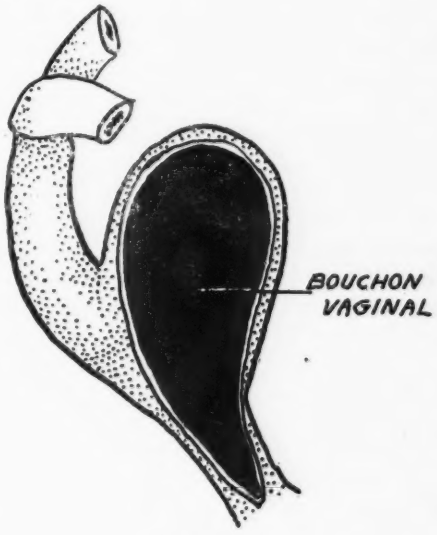

FIG. 16.
Lateral aspect of the uterus and vagina of a horse-shoe bat, with the vagina opened to show the vaginal plug.
(After Harrison Matthews)

The female becomes active again in the spring and ovulation occurs during March and early in April. The vagina is still tightly plugged by the bouchon, but some of the spermatozooa have already found their way to the uterus and fertilization is effected. Later in the year the plug begins to liquefy and to disintegrate and finally, during the summer months, it disappears altogether. According to Rollinat and

Trouessart the plug may be shed as an entity, occasionally, producing some laceration of the vaginal epithelium in the process. The plug is certainly entire and still *in situ*, blocking up the whole lumen of the vagina when pregnancy has already started. Pregnancy occurs (as with *Myotis* and other bats so far studied) only in the right uterine horn, and the young are born (in France) after a period of gestation of some 10 to 12 weeks.

The study of the British horse-shoe bats (*R. ferrum-equinum insulanus and R. hipposideros minutus*) has recently been continued by Harrison Matthews. His specimens were collected from colonies dwelling in caves in South Gloucestershire and North Somerset in 1937. His conclusions confirm in every detail the classical work of the French naturalists. Only a few minor points need be added to complete the story. It seems certain that female bats born during the year do not pair in the autumn of that year but retire for the winter without having experienced a period of oestrous. Only at the end of the 2nd year, when they are at least 15 months old, do they exhibit the phenomenon. Like the mole, the male bat experiences a sudden flare-up of sex at the mating season. At this time the sex glands and the accessory parts of the reproductive system undergo a relatively enormous enlargement. (See Fig. 17.) This flare-up takes place late in the summer and during the winter retrogressive changes set in. With the female, however, activity of the ovary does not begin until the spring, and Harrison Matthews depicts the female cycle of the British horse-shoe bats as follows: Prooestrus (September–October); Oestrus (end of October); Quiescence (November–March); Ovulation (first half of April); Pregnancy (May–June); Lactation anoestrus (July–August).

It has been held by some that this story is so strange that there may be an alternative explanation to that which involves the assumption that the spermatozooa have remained alive and potent to effect fertilization during the long interval from September to March or April. It has been thought probable that, although there is no doubt

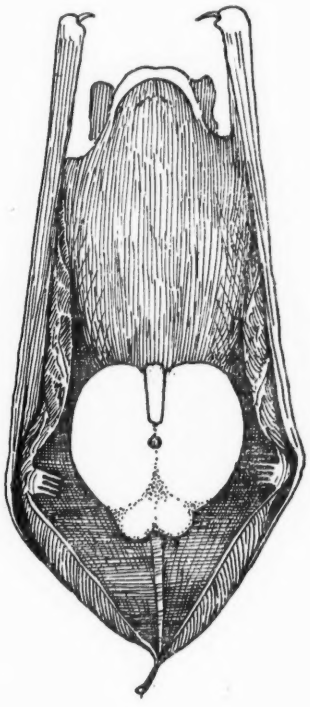

FIG. 17.

An adult male bat (*Vesperugo temminckii*) at the height of the breeding season in Nubia.

that spermatozooa are present in the uterus in October, it may not be these that fertilize the ovum in the following April. Pairing may take place again on the resumption of activity in the spring. But although such a thesis would be difficult to disprove apart from direct experiment (such as segre-

gating an autumn female and keeping it segregated until parturition) in the case of *Myotis*, disproof is simple in the case of *Rhinolophus*. The fact that the vagina is completely occluded by the bouchon during the 3rd week of April in English specimens entirely prohibits all possibility of coitus subsequent to its formation in November. Since in the April females, still retaining the intact and impenetrable plug, pregnancy has already started and the corpus luteum is fully developed, there can be no doubt fertilization has been effected by a spermatozoon that has remained alive and potent in the female passages for at least 5 months.

Almost certainly the curious story of the reproductive cycle of the bats is not unique even among British mammals. There still remains a wide and interesting field for precise scientific research into the reproductive histories of many common creatures.

We have been content for too long with the chance and unsystematic observations on the birth of young in captivity, with records made by interested but uninstructed country gentlemen and with the unsupported statements of those, who, having the killing of animals as a hobby, assume a right to knowledge by virtue of their claims to be considered as nature lovers.

The case of the common badger is an instance of the confusion that exists and must continue to exist in this country in the absence of scientific enquiry and the neglect of popularizing such information as is available from other sources. Statements as to the length of the period of gestation in this animal, made with assurance by the country-gentleman-sportsman type of observer, vary from 9 weeks (Pease) to 15 months (Cook). Apparently the reproductive habits of the badger have not impressed themselves on the simple countryman to the extent of having become incorporated into any countryside legend. The countryman exhausted his interest in the natural history of the badger when he coined the common error that Sir Thomas Browne refutes in Chapter V, Book 3, of his *Pseudodoxia Epidemica*: "That a brock or badger hath the legs of one side shorter than of the other, though an opinion perhaps not very ancient, is yet very generall; received not only by theorists and unexperienced believers, but assented unto by most who have the opportunity to behold and hunt them daily." To-day we do not have the opportunity to behold and hunt them daily. Their numbers have been too much reduced by persecution to permit of daily hunts. Badgers are not even baited for "sport" in modern England but they are freely slaughtered when met with. It seems rather regrettable that the opportunity of examining the condition of females in autumn, winter and spring has not been embraced by those "sportsmen" in this country who would still echo the sentiments of Dandie Dinmont in exclaiming in astonishment "Lord save us—to care about a brock." We appear to be content to perpetuate the old and unreliable observations in every account of the habits of the badger that gains currency in popular or country-lovers' literature. Even in literature that has pretensions to scientific purpose and claims to be authoritative, the same old anecdotes are repeated. Probably the most accurate statement that has been made on the reproductive habits of the badger in England is that which claims the oestrous period of the female as normally occurring in June and the birth of the young as taking place very uniformly in March of the following year. Such an observation falls into line with the researches of Eugen Fischer carried out on badgers in Baden. Fischer discovered that after the mating season in June and July

the fertilized egg remains quiescent and undergoes no development until the January of the following year. In July the egg measures some 1.5 mm. in all diameters, in December it has begun to enlarge so that by the end of the month it may be almost double its original size. In January real development commences and an embryo of some 5 mm. in length is present in the uterus. In February, Fischer records a foetus of 100 mm., and in March the offspring is born. In having this developmental "Ruhepause" the badger resembles the roebuck, for in Germany it has been determined that in the case of this animal which mates in the autumn, "the embryo does not develop beyond the segmentation stage until the following spring." Fischer's work was published in 1931; it is high time our indigenous writers on natural history discarded the country-gentleman-sportsman anecdotes along with the stories of the lopsided proportions of the badger's legs.

The Life of the Sperm in Certain Australian Marsupials.

Travellers' tales are proverbial as being symbols of unreliability. Perhaps in no other parts of the world have travellers been so suspected of enthusiastic overstatement on the one hand, or of pessimistic dwelling on hardships and on utter desolation on the other, as those stout men who first traversed the vast spaces of Central Australia. What one early traveller had described as a land flowing with milk and honey, another found to be no more than a heartbreaking monotony of hopelessly barren desert. The veracity of both was called in question. In the end both were proved right. In the vast spaces of Central Australia desert conditions may be changed with astonishing rapidity to verdant fertility. Baldwin Spencer described how, when members of the Horn Expedition of 1894 revisited, after a chance storm and a downpour of rain, the desolate gibber country where all had been "parched and silent, with no sign of life" on the outward journey, all was changed. "The whole change from sterility to exuberant life had taken place as if by magic *within the space of only a few days.*" He noted the effects of these profound and sudden environmental changes upon the fauna. He described how, with the advent of the chance downpour of rain, there is a strange outburst of reproductive activity, marked by the nesting of birds, the laying of eggs by amphibians and reptiles, and the begetting of young by the mammals. But he also drew attention to the other side of the picture. The period of abundance may be of very short duration. "Rapidly the country assumes its dry state, and the only animals left are the hardier forms which can withstand the heat and dryness, and the few inhabitants of the deeper and scattered water-holes." Reproductive activity ceases as suddenly as it flared up.

These things are not marked in their coming and going by dates in the calendar. They depend entirely on the chances of the rainfall, and it must be remembered that over a vast area in which the average annual rainfall is less than 10 inches, a chance downpour in a sudden storm may account for the major part of this amount. Moreover, in times of drought many years may pass without the advent of even a single shower.

One of the most striking facts concerning the whole story of the process of reproduction is its remarkable periodicity. There is an obvious relation between the seasons in the temperate zones of the world and the time of sexual activity of all forms of life. The sexual rhythm of the animal becomes set to that of the alternating seasons. It is well known that animals taken from the Southern to the Northern

hemisphere require a varying period of readjustment before they establish a settled rhythm to the reversed conditions of winter and summer.

So much attention has been devoted to the sexual cycle and to the seasonal periodicity of sexual activity that it may be that less than justice has been done to another aspect of the question. Although a nice adjustment of the parental sexual period to the season of the year is doubtless a very desirable thing, it is obviously not nearly so important as the adjustment of the time of the birth of the young to propitious times of weather and food supply. Perhaps more than most students of reproduction Heape has insisted on the importance of the "launching of the young at a favourable time of the year." It is manifestly useless that parental sexual activity should coincide with fair weather and abundance of food if the resulting offspring are to be ushered into a world in which conditions of adversity prohibit their survival. Some expedient must be resorted to if this catastrophe is to be avoided. Were the female horse-shoe bats, that mate in the mellowness of October in Central France, to embark straightaway upon the business of pregnancy, the unfortunate offspring would be born in December when the absence of insect life and the cold prohibit even the activity of the mother. It seems reasonable that we should seek for information concerning the possibilities of the life of the mammalian sperm among such animals as must needs regulate these things with regard to the "launching of the young at a favourable time of the year," rather than from the study of Man whose artificial environment renders him exempt from any such consideration.

In general, the seasons of the temperate parts of the world produce such regular alternations of propitious weather accompanied by abundant food supply with inclemency and scarcity, that adjustment of sexual and reproductive activity becomes regularly and permanently established, no matter by what physiological expedient it is brought about. But the animal that lives in such a fitful environment as that of Central Australia is faced by a much more formidable problem. It is true that the whole of the reproductive processes of the marsupials gives them exceptional facilities for facing the situation, for in all of them the period of gestation is very short. In the case of some of the marsupial inhabitants of the central area, the young are produced in as short a time as 8 or 9 days after mating, and it is probably true to say that none of them has a gestation period that normally exceed some 4 weeks. Nevertheless, short though the period is, it would seem likely that there may be need for a means of physiological readjustment, in an environment in which the transition from plenty to starvation is brought about by the sudden transformation effected in a few days. It is quite certain that this physiological readjustment does exist. Its extent we do not know, for our knowledge of the breeding of the marsupials of the centre lacks all the precise and intimate details that could only be ascertained by prolonged observations in changing seasons in the field. The anatomical details requisite for this physiological power of readjustment are now generally recognized; but their functional significance was long overlooked and even now it is not very widely appreciated.

As a matter of fact, the recognition of the makeshifts to secure a possible elasticity of the birth period in relation to season is bound up with the long story of the inquiries into the makeshift by which the birth passage of the young is formed.

In 1785, Everard Home had suggested that young kangaroos passed from the uterus to the outside world through the

median vagina and not by way of the lateral vaginae. He arrived at this conclusion mainly because in one of the specimens sent to John Hunter from New South Wales he found in the upper part of the median vagina some masses of a firmer material suspended in a collection of semifluid matter. The more solid particles he took to be an imperfect and partly disintegrated embryo passing into the median vagina.

Owen had no difficulty in showing that Home had been entirely wrong in supposing that this material had ever been a pregnancy of any sort and, as has so often happened in other connexions, it was the exposure of this rather patent error that caused the rejection of Home's perfectly correct conclusions as to the route of birth taken by the foetus.

Owen (1841) subsequently elaborated Home's observations and recorded that "it is not unusual to find the vaginae of kangaroos distended with a gelatino-mucous adhesive secretion containing hard irregularly shaped fibrous masses." Concerning the characters of this material he made, in a later work on the subject, an extraordinary shrewd comparison. The masses suspended in the semifluid matter he said "most resemble those coagulated masses that are found in the vesiculae seminales and sometimes in the urethra of the agouti, capromys, guinea-pig and others of the rodent order." This observation exactly parallels the finding by Rollinat and Trouessart of the "bouchon urethral" in male horse-shoe bats after the autumnal mating season. The next step was made by Edward Stirling of Adelaide. In 1889 he recorded and figured the condition that he had found in a female kangaroo (*Macropus major*) "shot immediately after an observed act of coitus." He found that "the lateral canals were enormously distended by what proved to be six-and-a-quarter ounces (by weight) of a viscid tenacious mucus-like substance." Fortunately he submitted this substance to microscopical examination and found that it "contained abundant spermatozooa." Owen described the site of the deposition of this material in the rat kangaroo ("*Hypriprymnus murinus*"—*Potorous tridactylus*). He considered the part of the lateral vaginae in which it was contained as an extension of the vaginal cul de sac and says that the cul de sac "expands upwards and outwards, dilating into a large chamber, which extends beyond the uteri in every direction." The dilatation in which the sperm-containing mucus is stored is, however, a development of the lateral vagina, rather than of the cul de sac, which is itself a secondary formation. The dilatation occurs on the lateral vaginal canal lateral to the ureter and constitutes a forwardly directed sac that extends, when distended, far ahead of the uterine portions of the tubes. In 1899, Hill added further descriptive accounts of these dilatations in other marsupials and gave them the name *vaginal caeca*. Since this name is liable to be confused with vaginal cul de sacs and since Hill himself says "the vaginal caeca function as receptacula seminis," it would seem that this latter is the best name to apply to them. (See Fig. 18.) These receptacula seminis are probably a common possession of practically all the Australian marsupials. They are recorded in *Potorous* by both Owen and Bass, in different species of *Macropus* by Owen and Stirling, in *Perameles* and *Peragele* (*Thalacomys*) by Hill and in *Choeropus* by Spencer. They occur also in *Dasycercus* and many of the other smaller carnivorous marsupials. In all these types they form a storehouse for the spermatozooa suspended in a mucous coagulum. There seems to be no doubt that the "viscid tenacious mucus-like substance" of Stirling and the "clear viscid

semifluid material" described by Hill in animals killed after recent coitus, corresponds with the "mucus blanc et epais" described by Rollinat and Trouessart in the female passages of bats during the autumnal mating season. It is almost equally certain that the "hard irregularly-shaped fibrous masses" described by Owen and the "masses of hard, opaque, caseous-looking substance of an albuminous nature" described by Hill in *Perameles* are the products of the inspissation of this material and are the equivalents of the bouchon vaginal of the bats.

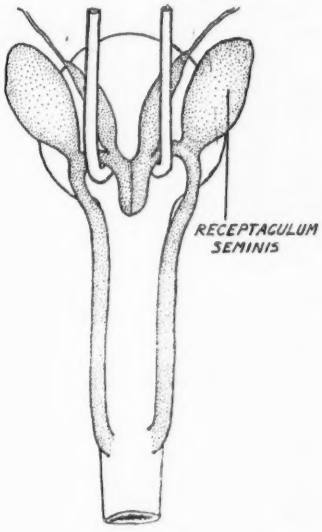

FIG. 18.

Diagram of the reproductive system of a female marsupial to show the receptacula seminis.

Records of the duration of pregnancy in the Australian marsupials are few and far between. In Owen's original observations in the Gardens of the Zoological Society in London, a female kangaroo (*Macropus major*) which mated on August 27th, produced its young on the night of October 4th —an interval of 38 days, but it is well known that the gestation period is subject to wide variations even in the uniform conditions prevailing in captivity. That the period may be shorter than the 38 days determined by Owen, the following case demonstrates. A female (*M. rufus*) mated on a single occasion, May 22nd, 1921, died, as the result of an accidental injury, 28 days later. In her pouch at the time of death was an embryo 55 mm. in length. At the time of birth the embryo is only about half this size and, since in this case there was no question of a previous mating, the young must have been born after a gestation period of considerably less than a month. On the other hand it may be quite remarkably prolonged. A male and female (*M. rufus*) were kept together in a large enclosure. Early in February 1922 the male died and no other was admitted. On July 4th an embryo, "not so large as the diameter of a shilling" was found in the female's pouch. In this case the interval was at least some $4\frac{1}{2}$ months. Macgilvaray of Broken Hill recorded many cases in which females separated altogether from the company of males produced young at intervals as long as 3 and 4 months after captivity. A more remarkable case is that of a pair of kangaroos sent from Sydney to the Zoological Gardens in Philadelphia. The male died on October 8th, 1908. Seven weeks after the male died an embryo was present in the female's pouch. This young—a female—was suckled until November 7th, 1909, and on September 25th, 1909, another, apparently new-born young, was present in the pouch. The interval in this remarkable, but apparently well authenticated case, being 11 months all but 3 days. Many other anomalous facts have been recorded such as the presence of an embryo in one uterus differing widely in age and size from that in the other; or a very immature embryo in a uterus while

a more mature offspring occupies the pouch.

No doubt if intimate study could be made of some of the smaller marsupials in the environment of Central Australia, many more remarkable facts could be learned concerning the time that spermatozooa may be stored and remain active in the receptacula seminis of animals subjected to the fluctuating conditions of life prevailing there.

REFERENCES TO THE LITERATURE CONCERNING THE LIFE OF THE SPERM.

Crew, F. A. E. "A suggestion as to the cause of the aspermatic condition of the imperfectly descended testis." *Journ. Anat.*, 1922, lvi, p. 98.

Hilderbrand. *Bull. U.S. Fisheries*, 1928, xlv, p. 25.

REFERENCES TO THE LITERATURE CONCERNING THE BATS.

Jones, F. Wood. "The genitalia of the Cheiroptera." Parts 1 and 2. *Journ. Anat. and Phys.*, 1916, li, p. 36.

Matthews, L. Harrison. "The female sexual cycle in the British horse-shoe bats." *Trans. Zool. Soc. Lond.*, Part 4. 1937, xxiii, No. 1, p. 224.

Robin, H. A. "Recherches anatomiques sur les mammiferes de l'ordre des Chiropteres." *Ann. Sci. Nat.*, 1881, Ser. 6, No. 2, p. 1.

Robin, H. A. "Sur l'epoque de l'accouplement des chauves souris." *Bull. Soc. Philan. Paris*, 1881, Ser. 7, No. 5, p. 88.

Rollinat, R. and E. Trouessart. "Sur la reproduction des Chiropteres." C. R. des Seances de la Soc. de Biol. *Seance.* January 26th, 1895, p. 53.

Rollinat, R. and E. Trouessart. "Sur la reproduction .des Chauves souris." *Bull. Soc Zool. de France*, 1895, xx, p. 25.

Rollinat, R. and E. Trouessart. "Sur la reproduction des Chauves souris." Part 1. *Mem. de la Soc. Zool. de France*, 1896, ix, p. 217; Part 2, 1897, x, p. 114.

REFERENCES TO THE LITERATURE CONCERNING THE LIFE OF THE SPERM IN MARSUPIALS.

Jones, F. Wood. "The mammals of South Australia." 1921–5, Vols. 1 and 2.

Spencer, Baldwin. "Report of the work of the Horn Scientific Expedition to Central Australia," 1896, Vol. 1.

Stirling, E. C. "On some points in the anatomy of the female organs of generation of the kangaroo." *Proc. Zool. Soc. Lond.*, 1889, p. 433.

Edward Rigby

A Chapter in the History of Antepartum Haemorrhage

BY

J. H. YOUNG, M.B., Ch.B., D.T.M.&H.

EDWARD RIGBY was born at Chowbent, Lancashire, on December 9th, 1747. Educated privately in early life, he arrived in Norwich in 1762 and became apprenticed to a Mr. David Martineau, an eminent surgeon of that city. His companions of this period of his life described him as "gay and fond of whatever would promote pleasantry and conviviality." After his apprenticeship, Rigby pursued his medical studies in London with all the advantages which medical education, at that time beginning to flourish there under the influence of the two Hunters, afforded. Admitted a member of the Royal College of Surgeons in 1769, he commenced practice in Norwich in the same year—a connexion which was not severed until his death 52 years later—on October 27th, 1821. In 1789 he was made a member of the Medical Society of London, and in 1814 took his degree of M.D. One of his first appointments was that of attending to all difficult cases of midwifery among the poor of the district. The experience so gained was the foundation of his future fame. For many years he was associated with the Norfolk and Norwich Hospital, first as surgeon and later as physician. At one time he was invited to join Osborn in London as a lecturer in midwifery but domestic circumstances prevented this arrangement.

He was a man of wide interests. He was made a Fellow of the Linnaean Society for his writings on botany and natural history, and later a Fellow of the Horticultural Society of London. He took a leading part in the public life of Norwich, being a member of the Corporation of Guardians in 1783, an Alderman in 1802, a Sheriff in 1803 and Mayor of the city in 1805. He was one of the founders of the "Norfolk Benevolent Society for the Relief of the Widows and Orphans of Medical Men," the second of its kind in the country. In a eulogy before the Norwich Philosophical Society, with which Rigby had a life-long association, John Cross spoke of him in these words: "To the most unbounded philanthropy he joined a zeal which overcame him on certain occasions, a retentive memory, extensive reading, quick recollection, and an imagination ever active and productive. . . . That which he thought right he would, on all occasions, fearlessly pursue, nor could abuse suffered, opposition offered, or injury sustained, drive him from the good purpose he had undertaken to execute. . . . He possessed the confidence of the public in a medical view not often obtained outside the metropolis. In the treatment of disease he was gentle and cautious and confided sufficiently in the powers of nature."

Rigby was the author of numerous scientific papers on many diverse subjects ranging from medicine to chemistry and agriculture, but to the medical profession: it is his "Essay on the Uterine Haemorrhage which precedes the Delivery of the full-grown Foetus, illustrated with cases," which is of outstanding interest. First published in 1775 as a small volume of 121

pages, it ran through six editions, the last in 1822, published after the death of the author, being expanded to twice the size of the original. A German translation was published in Leipzig in 1787 and a French edition, with notes by Mme. Boivin in 1818. It was well known in America and is believed to have been translated into Russian. In fact it became a volume known the world over.

Early in his career, as he relates in the preface to the fifth edition of his essay, Rigby met with a case of placenta praevia which he thought a rarity as he had not found such a circumstance "recorded in the lectures which I had attended or taken notice of in the common elementary treatises in midwifery." This rather curious statement makes one wonder how many of the "common elementary treatises" he had read. Smellie, to quote the outstanding authority of the time, knew of and described such cases. Later, finding such cases not uncommon, Rigby discovered that others had been recorded by many writers "though," he said, "in no instance which had then reached me had any practical inferences been deduced from it." It is not easy to agree with such a view.

After stressing the dangers of haemorrhage in the later months of pregnancy, in which he declared "the art of midwifery is likewise, in no instance, more at a loss in the use of means for the relief of the patient," he considered the various authors he had read on the subject. He tells us that he had not been able to determine "with any degree of certainty and satisfaction which of the two methods of practice hitherto recommended, it has been most proper to adopt"—whether to endeavour to restrain the haemorrhage and allow nature by her own efforts to expel the child or whether to proceed to deliver the child forthwith. No particular reason was given why different methods of treatment were employed in different cases, why in some cases it was successful and why in others failed. In short, the advice given was conflicting and contradictory. It was therefore necessary to know, Rigby went on, why in one case reliance might be placed upon the powers of nature and why in another such measures would endanger the life of the mother. This information he declared, should be procured early in labour.

The haemorrhage was due to a separation of the placenta from the uterus before the birth of the child. This might be produced by different causes, a knowledge of which was vital. With a placenta in its normal situation, its separation must be due to some "accidental circumstance, to violence done to the uterus by blows or falls, to some peculiar laxity of the uterine vessels from badness of habit, or fever, or to the influence of the passion of the mind suddenly excited such as fear, anger, etc." On the other hand, he went on, the placenta may be so situated that when "the full term of pregnancy is arrived and labour begins, a flooding *necessarily* accompanies it and without the intervention of any of the above *accidental* circumstances: that is when it is fixed to that part of the womb which always dilates as labour advances, namely the Collum and Os uteri, in which case it is very certain that the placenta cannot, as before described, remain secure till the expulsion of the child but must of necessity be separated from it in proportion as the uterus opens, and, by that means, an haemorrhage must be *unavoidably* produced." To Rigby must go the credit for introducing the terms "accidental haemorrhage" and "unavoidable haemorrhage."

Obviously, he went on, two such conditions, exactly similar in their first symptoms, must terminate differently if treated on expectant lines. Cases of accidental

haemorrhage should be treated thus; but with the placenta presenting, while palliative measures might for a time restrain the haemorrhage, it was bound to recur. His opinion that cases of accidental haemorrhage would terminate safely without manual assistance was, he tells us, supported by Charles White, and John Aikin of Warrington.

After stressing that it was vital that the presence or absence of the placenta in the lower uterine segment should be determined early in labour, he advised that for this purpose the whole hand should be introduced into the vagina and one finger inserted into the uterus, even if pain were caused to the patient by so doing. He recognized that this might be difficult especially in a primipara whereupon it was permissible to wait—"but let it be with the patient"—while increased discharge relaxed the parts. If the placenta was presenting, immediate delivery was to be undertaken. He cautioned, however, against too forcible dilatation of a closed or little-open cervix—"if the womb readily gives way, and the hand pass with ease, we may be certain no harm will follow and may, on that account, confidently prosecute the turning; but if on the contrary, there immediately come on a contraction of the os uteri that, in a purse-like manner, tightly surrounds the fingers, it will prove difficult, and we ought therefore to desist and wait till the parts be more relaxed by pain or discharge as difficulty, in these circumstances, is the truest criterion of danger."

When the placenta was not presenting at the mouth of the uterus Rigby advised awaiting the onset of natural pains, efforts to restrain the haemorrhage and general treatment of the patient being carried out meantime. Should this fail, "bring the uterus to a state of contraction by exciting some pains, which may often be done by gently irritating the os uteri with the finger; if this succeed, and the mouth of the uterus be thereby so far dilated that the distended membranes may be felt, they must be immediately pierced by passing a probe along the fingers, as upon the discharge of water thus produced the womb necessarily contracts to a certain degree and the flooding proportionately abates: this is, for the most part, soon succeeded by slight pains, which if the child present fair have very soon an effect upon it and push it down." If this failed—and he believed such cases to be very rare—version was indicated.

Rigby believed that even when the case appeared hopeless delivery by version should be attempted, "unexpected success" having sometimes occurred. He had no patience with those practitioners who abandoned their patients in such circumstances lest they should, by their ill-success, damage their reputations. He pointed out the dangerous state of the patient should always be impressed upon the relatives and advised a "second opinion" whenever possible.

A description of cases followed, 28 in the first edition, increased to 106 in the fourth and later editions—64 of these were of accidental haemorrhage, all the mothers recovering—and 42 of unavoidable haemorrhage with 31 successes.

Some years after Rigby's death a violent controversy arose concerning the priority of his doctrine. Burns[1] asserted that Rigby "published an abstract of the doctrines of Puzos and Levret with the addition of some cases from his own practice." Hamilton[2] went even further and declared that Rigby had "availed himself of the discoveries of Dr. Smellie and M. Levret while he contrived to make the profession believe that his doctrines were original," while Lee[3] stated that "no fact of the slightest importance has since (Smellie) been discovered relating to the

causes and treatment of uterine haemorrhage in the latter months of pregnancy." While it must be admitted that claims for originality in Rigby's observations cannot be established, such remarks were rather unfair and it cannot be denied that Lee, notoriously intolerant of criticism, quoted in his essay only such passages from Mauriceau as suited his purpose. This was amply demonstrated by Read.[4] It is also true that Puzos had previously suggested rupturing the membranes in cases of accidental haemorrhage and that Levret and Smellie had written on the treatment of placenta praevia by version. Levret,[5] however, mentioned only a few cases and Smellie's writings on the subject are rather scattered throughout the three volumes. Nevertheless Rigby's writings are well worthy of attention, being without doubt the clearest and most precise exposition on the subject of antepartum haemorrhage which had been published up to that time. As Collins[6] justly observed he was the "first English author who fully established this most important practical distinction in the treatment of uterine haemorrhage, although Levret had many years before published a somewhat similar statement."

One criticism which may be levelled at Rigby concerns his practice of effecting delivery immediately after performing version instead of bringing down a leg and then waiting for labour pains to expel the child, stimulants being given to the mother meanwhile. The value of such a procedure was recognized and practised by Smellie (Case 331).[7] Rigby was fortunate, too, in that he did not at any time appear to experience difficulty in delivering the after-coming head. Giffard,[8] the first British writer to describe a case of placenta praevia, recorded a number of cases in which he met with such a difficulty.

The subject of this essay should not be confused with his son of the same name (1804–60) who was also a writer of obstetrical subjects, notably his "System of Midwifery,"[9] first published in 1841, and who was for some time a lecturer at St. Thomas's Hospital, later occupying the chair of midwifery at St. Bartholomew's Hospital. He was the first president of the London Obstetrical Society (1859).

REFERENCES.

1. Burns, J. "Principles of Midwifery," 6th Edition. London: 1824.
2. Hamilton, J. "Practical Observations in Midwifery." Edinburgh: 1836.
3. Lee, R. *Edin. Med. and Surg. Journ.*, 1839, li, 389.
4. Read, W. "Placenta Praevia: its History and Treatment." Philadelphia: 1861.
5. Levret, M. "*L'Art des Accouchmens*," 3rd edition. Paris: 1766.
6. Collins, R. "A Practical Treatise on Midwifery." London: 1835.
7. M'Clintock, A. H. "Smellie's Treatise on the Theory and Practice of Midwifery." London: 1876.
8. Giffard, W. "Cases in Midwifery." London: 1734.
9. Rigby, E. "A System of Midwifery." London: 1841.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNAECOLOGISTS

The Quarterly Meeting of the Council was held on Saturday, 28th October, 1944, in the College House, with the President, Mr. Eardley Holland, in the Chair.

The following were admitted to the

Fellowship:

Leonard Colebrook, M.B., B.S.
Leonard Gregory Parsons, M.D., F.R.C.P.

Membership:

John Norman Inglis Emblin.
John Paton Erskine.
Alexander Havelock Maclennan, R.C.A.M.P. (*in absentia*).
Agnes Muir Stewart.
Elsie May Terry.
Irene Marianne Titcomb.

The following have satisfied the examiners and have been awarded the Diploma of the College:

Samuel James Barr.
Edward Kenyon Blackburn.
Donald Wilson Briggs.
Maud Lovett Buchanan.
Alison Clarke.
Josephine Alice Davidson.
Alexander Samuel Esslemont.
Phillip Kingsley Holding.
Joseph Kenneth Irving.
Robert John McConnell Jamieson.
Derek Llewelyn Hayman Jones.
Max Lipsitz.
Patrick Alfred Thomas Lowden.
John Michael Pallot.
Bhulabhai Dahyabhai Patel.
Jean Allan Robertson.
Margaret Oatway Thorpe.
Rudolph Alexander Kilgour Wiener.
Ruth Maud Harriet Winter.

INDEX TO CURRENT LITERATURE

In this Index an endeavour will be made, so far as war conditions permit, to maintain an up-to-date record of all titles bearing on obstetrics and gynaecology and the infant. The classification aims at making immediately available for the reader the titles under the various subject headings. In the majority of instances the title is obtained from the original publication. Where this has been impossible, the title has been obtained from the abstracting journal shown in brackets. Reprints will be welcomed and should be sent to the Editor.

Any inquiries should be addressed to Miss D. F. Atkins, British Postgraduate Medical School, Ducane Road, London, W. 12.

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ANATOMY

1. "The clinically suspect pelvis and its radiographical investigation in 1,000 cases." M. Kenny. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 277–92.

2. "Radiological pelvimetry. A New Zealand study." E. P. Allen. *New Zealand Med. Journ.*, June 1944, XLIII, 116–29.

3. "The clinical significance of midplane pelvic contraction." H. Thoms and P. C. Schumacher. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 52–7.

4. "Contracted pelvis in childbirth: a study of its morbid effects on mother and child." H. R. MacLennan. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 293–317.

5. "Histology and cytology of human and monkey placenta, with special reference to trophoblast." G. B. Wislocki and H. S. Bennett. *Journ. Anat.*, 1943, LXXIII, 335–449. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 447.)

PHYSIOLOGY

6. "Phases of maturation and fertilization in human ova." W. J. Hamilton. *Journ. Anat.*, 1944, LXXVIII, 1–4. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 446.)

7. "Recovery of primate eggs and embryos. Methods and data on time of ovulation." C. G. Hartman. *Western Journ. Surg.*, 1944, LII, 41. (*Inter. Abstr. Surg.*, August 1944, LXXIX, 121.)

8. "A study on the inactivation of ovarian hormones by the liver." P. Engel. *Endocrinology*, July 1944, XXXV, 70–2.

9. "Regeneration of monkey uterus after surgical removal of endometrium and accidental endometritis." C. G. Hartman. *Western Journ. Surg.*, March 1944, LII, 87. (*Journ. Amer. Med. Assoc.*, June 10th, 1944, CXXV, 456.)

10. "Response of intraocular endometrial implants to estrogens in the female rabbit." E. M. Jacobsen. *Endocrinology*, June 1944, XXXIV, 376–88.

PREGNANCY

General

11. "The elderly primipara." K. Kuder and D. G. Johnson. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 794–807.

Normal

Physiology

12. "Gain in weight during pregnancy." H. R. Robinson, A. F. Guttmacher, E. P. H. Harrison and J. M. Spence. *Child Development*, 1943, XIV, 131–42. (*Nutr. Abstr. Rev.*, July 1944, XIV, 112.)

13. "Capillary counts, capillary disappearance pressure and cutaneous lymphatic flow in normal pregnancy." E. Roberts, J. Q. Griffith and R. A. Kimbrough. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 776–83.

14. "The significance of blood histaminase in pregnancy." A. Ahlmark. *Lancet*, September 23rd, 1944, II, 406–7.

15. "Initial emptying time of stomach in primigravidae as related to evacuation of biliary tract." E. A. Boyden and L. G. Rigler. *Proc. Soc. Exper. Biol. and Med.*, June 1944, LVI, 200–1.

16. "Medical progress. The parathyroid glands and parathormone." A. Pope and J. C. Aub. *New England Journ. Med.*, June 8th, 1944, CCXXX, 698–707. (In pregnancy, pp. 701–2.)

Diagnosis.

17. "Evaluation of Gruskin's intradermal test for pregnancy." V. R. Naidu and C. D'Souza. *Indian Med. Gaz.*, May 1944, LXXIX, 204–6.

18. "Effect of illumination on the egg-extrusion reaction of Xenopus laevis in the frog test for pregnancy." A. I. Weisman and C. W. Coates. *Endocrinology*, July 1944, XXXV, 68–9.

19. "Experience with the Hogben test." F. Geoghegan and J. McGrath. *Irish Journ. Med. Sci.*, September 1944, 6th series, No. 225, 509–16.

Duration

20. "Um estudo sobre a duracão da prenhez." (Studies on the duration of pregnancy). O. P. Cirne. *Obstet. y Ginec. Latin-Amer.*, May 1944, II, 319–43.

Antenatal examination

21. "Visualización de la placenta por el método de los tejidos blandos." (Soft tissue placentography.) E. T. Lastra and J. MacLean. *Obstet. y. Ginec. Latin-Amer.*, March 1944, II, 205–12.

22. "Problems in obstetrics. Measurement of the pelvis." M. Reddington. *Clin. Journ.*, July/August 1944, LXXIII, 148–51.

See also Ref. 1, 2, 3, 4.

Nutrition

23. "La alimentación de la gravida y la madre que cria." (Diet in pregnancy and lactation.) *Inst. Nac. Nutricion Buenos Aires*, 1942, Publ. Cient. C.N.P., 13, Ed. 2, pp. 81. (*Nutr. Abstr. Rev.*, July 1944, XIV, 125.)

24. "Alimentación de la mujer embarazada." (The diet of the pregnant woman.) F. P. Acosta. *Rev. Med.-quir. Oriente*, 1943, IV, 223–32. (*Nutr. Abstr. Rev.*, July 1944, XIV, 118.)

25. "Antenatal diet and its influence on stillbirths and prematurity." C. S. Cameron and S. Graham. *Glasgow Med. Journ.*, July 1944, XXIV, 1–7.

26. "The significance of fetal hiccoughs. Allergy." W. A. McGee. *Southern Med. Journ.*, 1943, XXXVI, 508. (*Biol. Abstr.*, June/July 1944, XVIII, 1210.)

27. "Contribution to the problem of vitamin B_1 deficiency during pregnancy." A. Sadowsky and J. Diamont. *Acta. Med. Orientalia* (Jerusalem), December 1943, II, 203–4. (*Bull. Hygiene*, June 1944, XIX, 465.)

28. "Degeneration of the corpora lutea in the pregnant vitamin E deficient rat." B. H. Ershoff. *Anat. Rec.*, 1943, LXXXVII, 297–301. (*Nutr. Abstr. Rev.*, July 1944, XIV, 55.)

29. "Nitrogen balances on rats during pregnancy and lactation." L. M. Morse and C. L. A. Schmidt. *Proc. Soc. Exper. Biol. and Med.*, May 1944, LVI, 57–9.

ABNORMAL

General

30. "The possible significance of vaginal smears in the diagnosis of certain disturbances of pregnancy." W. Schuman. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 808–16.

Toxaemias

31. "A suggested proposal for the classification of toxaemias of pregnancy." P. Titus. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 817–20.

32. "The hypertensive factor in the late toxaemias of pregnancy." P. R. Thiagarajah. *Journ. Ceylon Branch Brit. Med. Assoc.*, April 1943, XL, 25–49. (*Bull. Hygiene*, June 1944, XIX, 404.)

33. "The effect of pregnancy on blood-pressure in normotensive and hypertensive dogs." S. Rodbard and L. N. Katz. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 753–63.

34. "Effects of pyridoxine on nausea and vomiting of pregnancy: results of treatment of 40 patients." W. M. Silbernagel and O. P. Burt. *Ohio State Med. Journ.*, December 1943, XXXIX, 1113. (*Bull. Hygiene*, June 1944, XIX, 405.)

35. "Pernicious vomiting of pregnancy" (letter). M. M. Marbel. *Journ. Amer. Med. Assoc.*, July 22nd, 1944, CXXV, 867.

Placenta praevia and accidental haemorrhage.

36. "A case of complete placenta praevia accreta occurring in a primigravida." D. M. Shotton and C. W. Taylor. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 340–3.

37. "Concealed accidental haemorrhage: report of a case." L. A. Riddell. *New Zealand Med. Journ.*, June 1944, XLIII, Obstet. and Gynaecol. Sect., 5–6.

38. "Accidental haemorrhage in two successive pregnancies within 16 months." N. L. Keevil. *Brit. Med. Journ.*, September 16th, 1944, II, 374.

Abortion

39. "Sonda de Nélaton intraperitoneal a causa de maniobras abortivas." (Intraperitoneal use of Nelaton catheter to procure abortion.) A. Zeceña. *Obstet. y Ginec. Latin-Amer.*, March 1944, II, 217–20.

40. "Feto papiraceo." (Papyraceous foetus.) N. O. di Fonzo. *Obstet. y Ginec. Latin-Amer.*, May 1944, II, 373–9.

41. "Intrauterine pastes" (letter). G. Strassmann. *Journ. Amer. Med. Assoc.*, July 1st, 1944, CXXV, 673.

42. "Air embolism in criminal abortion." D. Teare. *Lancet*, August 19th, 1944, II, 242.

43. "Vesicovaginal fistula, foreign body and calculi in bladder following attempted criminal abortion and normal labour." R. C. Thomas. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 350–2.

Association with disturbances of other maternal systems

44. "Calcium gluconate and vitamin D in neuro-muscular dystrophy during pregnancy and labor." J. R. Goodall. *Journ. Mt. Sinai Hosp.*, 1943, X, 119–31. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 470.)

45. "Abdominal pain in pregnancy." E. C. Fahmy. *Edin. Med. Journ.*, May 1944, LI, 229–46.

46. "A comparison of newborn infants with erythroblastosis fetalis with those born to diabetic mothers." H. C. Miller, R. D. Johnson and S. H. Durlacher. *Journ. Pediatr.*, June 1944, XXIV, 603–15.

47. "The relationship between hormonal abnormalities and accidents of late pregnancy in diabetic women." O. W. Smith, G. Van S. Smith and D. Hurwitz. *Amer. Journ. Med. Sci.*, July 1944, CCVIII, 25–35.

48. "Fetal and neonatal mortality complicated by diabetes." H. Dolger and J. Herzstein. *Journ. Amer. Med. Assoc.*, July 29th, 1944, CXXV, 931.

Blood

49. "Severe anaemia in pregnancy." S. N. Upadhyay. *Indian Med. Gaz.*, May 1944, LXXIX, 193–8.

50. "Macrocytic anemia of pregnancy" (letter). A. S. Wiener. *Journ. Amer. Med. Assoc.*, August 5th, 1944, CXXV, 990.

51. "A survey of the haemoglobin levels of the poor classes in Aberdeen." H. Fullerton, M. I. Mair and P. Unsworth. *Brit. Med. Journ.*, September 16th, 1944, II, 373–4.

52. "Nutritional iron deficiency anaemia in wartime. III. The haemoglobin levels of school children and pregnant women in 1944, compared with the levels in 1942 and 1943." L. S. P. Davidson, G. M. M. Donaldson, S. T. Lindsay and M. H. Roscoe. *Brit. Med. Journ.*, September 9th, 1944, II, 333–4.

53. "Myelogenous leucemia complicating pregnancy." H. M. Angelucci. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 125–8.

54. "Splenectomy in pregnancy complicated by thrombocytopenia purpura hemorrhagica" (letter). D. Polowe. *Journ. Amer. Med. Assoc.*, June 24th, 1944, CXXV, 592.

55. "The importance of the Rh factor in obstetrics." V. Krieger. *Med. Journ. Austr.*, May 27th, 1944, I, 480–3.

Association with infectious diseases

56. "Tuberculosis and pregnancy." E. Hull. *New Orleans Med. and Surg. Journ.*, 1944, XCVI, 321. (*Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 142.)

57. "Pulmonary tuberculosis and pregnancy." J. Smart. *Postgrad. Med. Journ.*, July 1944, XX, 198–201.

58. "The effect of the endotoxin of Shigella paradysenteriae on pregnancy in rabbits." P. A. Zahl and C. Bjerknes. *Proc. Soc. Exper. Biol. and Med.*, June 1944, LVI, 153–5.

59. "Venereal disease in relation to pregnancy." W. N. Mascall. *Postgrad. Med. Journ.*, July 1944, XX, 189–97.

60. "A discussion of the acute conditions arising in patients with lymphogranuloma venereum." W. P. Longmire. *Surgery*, June 1944, XV, 997–1016. (Pregnancy, pp. 1008–10.)

Association with disturbances of the reproductive system

61. "Septate vagina complicated by pregnancy." N. H. Olesker. *Canad. Med. Assoc. Journ.*, July 1944, LI, 51–3.

62. "Utero doble—vagina doble. Embarazo simultaneo." (Double uterus and vagina with pregnancy.) P. E. Borras. *Obstet. y Ginec. Latin-Amer.*, June 1944, II, 478–85.

63. "Carcinoma in relation to pregnancy." G. Hill. *Postgrad. Med. Journ.*, July 1944, XX, 202–5.

64. "Embarazo y cancer del cuello uterino." (Pregnancy and cancer of the cervix.) B. C. Mönckeberg. *Obstet. y Ginec. Latin-Amer.*, June 1944, II, 417–34.

Ectopic pregnancy

65. "Positive pregnancy test without endometrial decidua in ectopic pregnancy." H. I. Kantor and S. Wimpfheimer. *Journ. Mount Sinai Hosp.*, 1944, X, 601–4. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 470.)

66. "Embarazo extrauterino abdominal e intraligamentario con feto vivo." (Abdominal and intraligamentous pregnancy with a living child.) R. Cravioto. *Obstet. y Ginec. Latin-Amer.*, March 1944, II, 213–7.

67. "Primary abdominal pregnancy. Case report." J. J. Weiner. *Amer. Journ. Surg.*, August 1944, LXV, 288–9.

68. "A case of ovarian pregnancy." A. E. Moore. *Austr. and New Zealand Journ. Surg.*, April 1944, XIII, 261–4.

69. "A case of primary ovarian pregnancy." O'D. Browne. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 321–3.

70. "Interstitial ectopic pregnancy." L. A. Thunig. *Amer. Journ. Obstet. and Gynecol.* July 1944, XLVIII, 114–8.

71. "Unruptured interstitial pregnancy." J. J. Keenan. *Amer. Journ. Surg.*, July 1944, LXV, 112–5.

Miscellaneous

72. "Rupture of rectus abdominis as a complication of pregnancy." S. W. Liggett. *Brit. Med. Journ.*, August 19th, 1944, II, 245.

LABOUR

General

73. "Childbirth in the Greek island of Chios in the 6th century B.C., 1780 and 1914." P. Argenti. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 344–9.

Normal

74. "A simple umbilical cord clamp." H. S. Fist. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 135.

Anaesthetics, Analgesics

75. "Birth under hypnosis." Editorial. *Brit. Med. Journ.*, September 16th, 1944, II, 379–80.

76. "Continuous caudal anaesthesia in obstetrics." L. M. Randall. *Journ. Lancet*, January 1944, LXIV, n.s., 7–11; *Collected Papers of the Mayo Clinic*, 1943, XXXV, 278–88.

77. "Continuous caudal analgesia in obstetrics. A commentary." A. Baptisti. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 103–8.

78. "Analgesia and anesthesia for obstetrics, inhalation methods." W. A. Conroy. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 81–4.

79. "Local anesthesia." H. Buxbaum. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 90–3.

80. "Continuous caudal anaesthesia with pontocaine: obstetrician's viewpoint." J. E. Fitzgerald, J. M. Thomson and H. O. Brown. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 94–9.

81. "Continuous caudal anaesthesia with procaine hydrochloride in 240 obstetric patients." W. F. Mengert. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 100–2.

82. "Discussion on symposium on obstetrical anesthesia on the papers by Drs. Fitzgerald, Mengert, Buxbaum and Conroy." *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 85–9.

83. "Caesarean section under spinal analgesia." R. C. Thomas. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 324–9.

84. "Chloral and alcohol in labour" (letter). S. Cooke. *Lancet*, September 23rd, 1944, II, 423.

85. "Cyclopropane-pituitrin incompatibility." S. Belinkoff. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 109–13.

86. "Intravenous administration of vinbarbital sodium for induction of obstetric amnesia." J. R. Evans. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 821–5.

Abnormal

87. "The prognosis and management of premature rupture of the membranes." E. H. Bishop. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 45–51.

88. "Fetal dystocia from a face presentation with forelying elbow." J. J. Gill. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 133–4.

89. "Conservative treatment of acute inversion of the uterus." H. Burwig. *Surg., Gynecol. and Obstet.*, February 1944, LXXVIII, 211–2.

90. "A case of acute inversion of the uterus." A. E. Chisholm. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 318–20.

Multiple birth

91. "Sobre un caso de embarazo cuadruple." (A quadruple pregnancy.) J. Di Bitonto and S. Wilber. *Obstet. y Ginec. Latin-Amer.*, June 1944, II, 465–77.

PUERPERIUM

NORMAL

92. "Getting patients out of bed early in the puerperium." M. L. Rotstein. *Journ. Amer. Med. Assoc.*, July 22nd, 1944, CXXV, 838–40.

93. "A statistical study of the purpose and errors of the routine daily measurement of the puerperal uterus." C. Scott Russell. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 334–9.

Lactation

94. "Lactation." W. E. Peterson. *Physiol. Rev.*, July 1944, XXIV, 340–71.

See also Ref. 23.

ABNORMAL

Infections

95. "La sulfaminoterapia local intrauterina en la profilaxis de la sepsis puerperal." (Local intrauterine sulphonamide therapy in the prevention of puerperal sepsis.) M. L. Perez and O. Blanchard. *Obstet. y. Ginec. Latin-Amer.*, March 1944, II, 165–78.

THE INFANT

GENERAL

96. "Cord transfusion in newborn infants." H. W. Mayes. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 36–44.

97. "Tibial bone marrow infusions in infancy." H. I. Arbeiter and J. Greengard. *Journ. Pediatr.*, July 1944, XXV, 1–12.

98. "Bone marrow infusions as a routine procedure in children." F. Meola. *Journ. Pediatr.*, July 1944, XXV, 13–16.

99. "Vomiting during the first few days of life." E. H. Running. *Southwest Med.*, November 1943, XXVII, 274. (*Amer. Journ. Digest. Dis.*, July 1944, XI, 235.)

100. "Vomiting in the newborn." D. Levi. *Postgrad. Med. Journ.*, July 1944, XX, 205–8.

101. "Asphyxia in the newborn." W. K. McIntyre. *Med. Journ. Austr.*, June 24th, 1944, I. 580–3.

102. "Respiratory shift in epigastric abdominal wall—a physical sign seen with complete unilateral paralysis of the diaphragm in infants and children." J. S. Light. *Journ. Pediatr.*, June 1944, XXIV, 627–34.

103. "Bleeding peptic ulcer in infancy." L. E. Meiselas and A. H. Russakoff. *Amer. Journ. Dis. Childr.*, May 1944, LXVII, 384–6.

104. "Spontaneous subarachnoid hemorrhage in infants and its relation to hydrocephalus." S. G. Babson. *Journ. Pediatr.*, July 1944, XXV, 68–73.

INFECTIONS

105. "The role of the surgical mask in the prevention of cross-infections in hospital nurseries for newborn infants." H. Abramson. *Journ. Pediatr.*, June 1944, XXIV, 684–90.

106. "Ophthalmia neonatorum, with special reference to the sulfonamides in treatment and the continued importance of silver preparations in prevention." C. Berens. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 855–8.

107. "Tetanus neonatorum in the tropics. A suggestion for its reduction." L. Rogers. *Indian Med. Gaz.*, July 1944, LXXIX, 297–8.

108. "An epidemic of influenza A in infants and children. A clinical and laboratory investigation." J. M. Adams, M. P. Thigpen and E. R. Rickard. *Journ. Amer. Med. Assoc.*, June 17th, 1944, CXXV, 473–6.

109. "Development of antibody following vaccination of infants and children against pneumococci." H. L. Hodes, J. F. Ziegler and H. D. Zepp. *Journ. Pediatr.*, June 1944, XXIV, 641–9.

110. "Purulent pericarditis complicating pneumonia. Recovery in an infant following therapeutic aspiration and the development of pneumopericardium." M. Cooperstock. *Journ. Pediatr.*, June 1944, XXIV, 656–61.

111. "Pneumococcic meningitis. Complete recovery of a six-month-old infant treated with penicillin." A. M. Litvak, E. Appelbaum and M. Greene. *Amer. Journ. Dis. Childr.*, June 1944, LXVII, 485–6.

112. "Oral moniliasis in newborn infants." N. A. Anderson, D. N. Sage and E. H. Spaulding. *Amer. Journ. Dis. Childr.*, June 1944, LXVII, 450–6.

113. "Prophylactic value of sulfathiazole against neonatal gonococcic conjunctivitis." M. Gleich, M. L. Blumberg and A. S. Mason. *Amer. Journ. Dis. Childr.*, June 1944, LXVII, 472–3.

114. "Gastro-enteritis in children: a report on the bacteriology of 20 cases caused by *Bacterium typhi-murium* and 2 cases caused by *Bacterium reading*." F. Draper. *Med. Journ. Austr.*, June 10th, 1944, I, 533–7.

115. "Discussion on parenteral diarrhoea." T. F. McN. Scott *et al.* *Proc. Roy. Soc. Med.*, July 1944, XXXVII, 479–82.

116. "Penicillin and sulphonamides in infantile gastro-enteritis." E. Burns and W. Gunn. *Brit. Med. Journ.*, August 5th, 1944, II, 178–80.

See also Ref. 125, 126.

CONGENITAL DEFECTS

117. "Hereditary factors in multiple congenital deformities. Report of two cases." A. A. Hobbs. *Amer. Journ. Roentgenol.*, June 1944, LI, 677–81.

118. "A diencephalic three-armed full-time European child." S. J. Cohen. *South Afr. Med. Journ.*, August 12th, 1944, XVIII, 262–4.

119. "'Congenital' muscular torticollis." F. A. Chandler and A. Altenberg. *Journ. Amer. Med. Assoc.*, June 17th, 1944, CXXV, 476–83.

120. "Autonomic nervous system imbalance of the whole gastrointestinal tract in the newborn infant." G. N. Krost. *Journ. Pediatr.*, June 1944, XXIV, 635–40.

121. "Epiphysial dysgenesis associated with cretinism in a premature infant." M. L. Blatt, M. Zeldes and J. Goodfriend. *Amer. Journ. Dis. Childr.*, June 1944, LXVII, 480–4.

122. "Traumatic separation of the upper femoral epiphysis. A birth injury." P. C. Kennedy. *Amer. J. Roentgenol.*, June 1944, LI, 707–19.

123. "Combined anterior and posterior spina bifida in living neonatal human." R. L. de C. H. Saunders. *Anat. Rec.*, 1943, LXXXVII, 255–78. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 446.)

124. "Iniencephalus." S. J. Paterson. *Journ. Obstet. and Gynaecol. Brit. Emp.*, August 1944, LI, 330–3.

125. "Congenital chickenpox with disseminated visceral lesions." E. H. Oppenheimer. *Bull. Johns Hopkins Hosp.*, April 1944, LXXIV, 240–50.

126. "Congenital malaria in England." R. P. Gammie. *Lancet*, September 16th, 1944, II, 375–6.

BLOOD

127. "Haematological studies in the newborn with special reference to blood changes during the first week." B. Kumar. *Journ. Indian Med. Assoc.*, 1944, XIII, 133–7. (*Nutr. Abstr. Rev.*, July 1944, XIV, 86.)

128. "Erythroblastosis fetalis and Rh factor." A. S. Rubnitz. *Nebraska State Med. Journ.*, 1943, XXVIII, 372–5. (*Brit. Chem. Physiol.* Abstr., A III, July 1944, 451.)

129. "Erythroblastosis fetalis. A proposed definition and clarification of the term." M. T. Macklin. *Amer. Journ. Dis. Childr.*, June 1944, LXVII, 445–9.

See also Ref. 46.

NUTRITION

130. "The breast feeding of infants." Editorial. *Med. Journ. Austr.*, June 24th, 1944, I, 587–9.

131. "Infant feeding" (letter). S. Dickinson. *Brit. Med. Journ.*, August 19th, 1944, II, 255.

132. "Amino-acids for premature babies." Annotation. *Lancet*, September 9th, 1944, II, 350–1.

WELFARE

133. "The EMIC Program." *Journ. Pediatr.*, July 1944, XXV, 88–91; Editorial, 97–102.

134. "Nature and nurture." Annotation. *Lancet*, August 19th, 1944, II, 252.

135. "Ultra-violet treatment at welfare centres" (letter). S. T. Beggs. *Brit. Med. Journ.*, August 19th, 1944, II, 256.

136. "Child health. II. The organization of child welfare centres." C. Asher. *Practitioner*, August 1944, CLIII, 112–20.

137. "Child health. III. Some common problems of infant welfare work." F. J. G. Lishman, with an appendix by E. S. Davies. *Practitioner*, September 1944, CLIII, 172–86.

MORTALITY

138. "Studien über Fruhtod, Geschlechtsverhältnis und Selektion. 5. Die Säuglingssterblichkeit." (Studies of early mortality, sex ratio and selection. 5. Infant mortality.) M. Pfaundler. *Zts. Kinderheilk.*, 1943, LXIV, 1–85. (*Nutr. Abstr. Rev.*, July 1944, XIV, 135.)

139. "Births, infant mortality and maternal mortality in the United States, 1942." J. Yerushalmy. *Publ. Health Rep.* (Washington), June 23rd, 1944, LIX, 797–810.

140. "Social conditions and infant mortality." B. Woolf. *Mother and Child*, June 1944. (*Nutr. Abstr. Rev.*, July 1944, XIV, 134.)

141. "Child spacing, youth and fetal mortality." Editorial. *Journ. Amer. Med. Assoc.*, June 10th, 1944, CXXV, 432.

See also Ref. 25, 48.

MATERNAL WELFARE

See Ref. 133.

MATERNAL MORTALITY

See Ref. 139, 146.

OBSTETRIC OPERATIONS

142. "Problems in obstetrics. The forceps." M. Reddington. *Clin. Journ.*, September/October 1944, LXXIII, 182–6

143. "Hollow needle for repair of perineum." J. S. Laurie. *Brit. Med. Journ.*, September 9th, 1944, II, 342.

144. "Episiotomy" (letters). *Brit. Med. Journ.*, 1944, II: G. S. N. Dow. August 5th, 193; D. J. P. O'Meara, September 9th, 353; W. E. H. Banks, September 16th, 385.

145. "A five-year survey of Cesarean sections in Ramsey County, Minnesota." A. Skinner. *Minnesota Med.*, 1944, XXVII, 124. (*Int. Abstr. Surg.*, August 1944, LXXIX, 126.)

146. "Cesarean section morbidity and septic mortality in relation to the type of operation." C. Briscoe. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 16–25.

See also Ref. 83.

MISCELLANEOUS

147. "Nomenclatura y vocablos neuvos en obstetricia. Necesidad de depurar el lenguaje cientifico. La nomenclatura del Prof. Josué A. Beruti." (Nomenclature and new words in obstetrics. Need of purifying scientific language. Prof. J. A. Beruti's nomenclature.) E. Landa. *Obstet. y Ginec. Latin-Amer.*, June 1944, II, 450–63.

148. "Medical and clinical report of the Women's Hospital, Sydney, 1942–3." *Med. Journ. Austr.*, July 1st, 1944, II, 21–2.

149. "Report of the Rotunda Hospital (November 1st, 1942 to October 31st, 1943)." N. McI. Falkiner. *Irish Journ. Med. Sci.*, August 1944, 6th series, No. 224, 233–371.

150. "Clinical report of the Coombe Lying-in Hospital, 1943." E. A. Keelan, M. J. O'Higgins and J. B. Kearney. *Irish Journ. Med. Sci.*, August 1944, 6th series, No. 224, 372–410.

151. "Clinical report of the National Maternity Hospital." A. Spain, C. Coyle and T. Boland, *Irish. Journ. Med. Sci.*, August 1944, 6th series, No. 224, 411–77.

GYNAECOLOGY

General

152. "The significance of transillumination of the cervix uteri." Editorial. *Amer. Journ. Surg.*, July 1944, LXV, 1–2.

153. "Anal and vulvar pruritus." J. A. Scott. *Practitioner*. August 1944, CLIII, 107–11.

154. "Treatment of vulvovaginitis (in children) with oestrogens." W. E. Brown. *Nebraska State Med. Journ.*, 1943, XXVIII, 354–8. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 468.)

DISORDERS OF FUNCTION

Menstrual disorders

155. "The frequency of anovulatory menstruation as determined by endometrial biopsy." A. B. Levan and P. B. Szanto. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 75–80.

156. "The oral treatment of ovarian deficiency with conjugated estrogens-equine." F. E. Harding. *Western Journ. Surg.*, 1944, LII, 31. (*Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 137.)

157. "Abroma Augusta. A pharmacologic study with special reference to its action on the uterus." N. K. Bhattacharyya, B. Mukhoti and S. Sengupta. *Calcutta Med. Journ.*, January 1944, XLI, 1–9.

158. "The excretion of sodium pregnanediol glucuronidate in the urine following oral administration of anhydro-hydroxyprogesterone and progesterone to patients with secondary amenorrhea." W. M. Allen, E. Viergiver and S. D. Soule. *Journ. Clin. Endocrinol.*, May 1944, IV, 202–7.

159. "Zondek's simplified treatment of secondary amenorrhea." R. S. Finkler. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 26–35.

160. "A study of the endometrial pattern before and after treatment for amenorrhea." W. Bickers. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 58–68.

161. "Intramenstrual bleeding and abdominal pain." R. N. Rutherford. *Western Journ. Surg.*, February 1944. (*Med. Journ. Austr.*, June 17th, 1944, I, 566.)

Menopause

162. "Hemorrhage in the menopause." L. M. Randall. *Minnesota Med.*, November 1943, XXVI, 976–9; *Collected Papers of the Mayo Clinic*, 1943, XXXV, 290–3.

163. "Abnormal uterine bleeding after middle age." R. D. Mussey and T. R. Wilson. *Journ. Michigan State Med. Soc.*, February 1944, XLIII, 129–38; *Collected Papers of the Mayo Clinic*, 1943, XXXV, 264–6.

Sterility

164. "Sterility in the female." W. D. Suggs. *South. Med. Journ.*, 1943, XXXVI, 616. (*Journ. Clin. Endocrinol.*, May 1944, IV, 220.)

165. "Social and psychological factors affecting fertility. II. Variations in the size of completed families of 6,551 native-white couples in Indianapolis." C. V. Kiser and P. K. Whelpton. *Milbank Mem. Fund Quarterly*, January 1944, XXII, 61–94. (*Journ. Amer. Med. Assoc.*, July 15th, 1944, CXXV, 818.)

166. "Practical details in the management of sterility, with special reference to endocrine factors." S. R. Meaker, C. H. Lawrence and S. N. Vose. *New Engl. Journ. Med.*, June 22nd, 1944, CCXXX, 755–60.

167. "Some causes of sterility." Editorial review. *Brit. Med. Journ.*, September 9th, 1944, II, 346.

168. "A note on the problem of subfertility." C. S. Lane-Roberts. *Postgrad. Med. Journ.*, August 1944, XX, 232–6.

169. "The organization of a sterility service within a Family Planning Association clinic." M. H. Jackson. *Postgrad. Med. Journ.*, August 1944, XX, 237–46.

170. "The endocrine treatment of sterility." M. M. White. *Postgrad. Med. Journ.*, August 1944, XX, 215–22.

171. "Salpingitis and tubal patency." F. L. Schwartz. *Amer. Journ. Surg.*, July 1944, LXV, 65–73.

172. "Uterotubal insufflation and hysterosalpingography." P. Malpas. *Postgrad. Med. Journ.*, August 1944, XX, 223–8.

ABNORMALITIES OF THE REPRODUCTIVE ORGANS

173. "Um caso de fistula tuberculosa salpingo-vesical." (A tuberculous tubal-vesical fistula.) M. Macedo. *Amatus Lusitana*, April 1944, III, 249–51.

174. "Congenital vaginal occlusion of the cervix." W. T. Dannreuther. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 826–34.

175. "Intestinal obstruction associated with defects in the broad ligaments of the uterus. Review of literature and case report." T. V. Goode and W. R. Newbern. *Amer. Journ. Surg.*, July 1944, LXV, 127–32.

176. "Hiperplasia tecal y androtricosis." (Thecal hyperplasia and hirsutism.) J. A. Salaber, A. E. Nogués and R. Sammartino. *Obstet. y Ginec. Latin-Amer.*, June 1944, II, 435–50.

177. "True hermaphroditism: a report of two cases." R. B. McIver, D. R. Seabaugh and M. Mangels. *Journ. Urology*, July 1944, LII, 67–85.

178. "True hermaphroditism. Report of a case with mammary carcinoma." J. D. Moriarty. *Amer. Journ. Path.*, July 1944, XX, 799–807.

179. "A case of intersexuality (Pseudohermaphroditism)." A. Sharman. *Glasgow Med. Journ.*, August 1944, CXLII, 40–4.

See also Ref. 61, 62.

INFECTIONS OF THE REPRODUCTIVE ORGANS

180. "Genital tuberculosis in the female." R. L. Haas. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 69–74.

181. "One-day sulfonamide treatment of chronic gonorrhea in the female." H. Strauss, S. Goldstein, E. A. Horowitz and E. Meyer. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 838–44.

182. "The diagnostic confusion between acute appendicitis and pelvic inflammatory disease." F. F. Boyce. *New Orleans Med. and Surg. Journ.*, 1944, XCVI, 303. (*Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 140.)

183. "The morphology and biology of the yeasts encountered in vaginal mycoses." K. H. Zobl. *Arch. Hyg. Bakt.*, 1943, CXXX, 205–37. (*Bull. Hyg.*, June 1944, XIX, 485.)

184. "Actinomycosis of the ovary." J. C. Ahumada, R. M. Chevalier and R. Sammartino. *Bol. Soc. Obstet. Ginec. Buenos Aires*, 1943, XXII, 7. (*Int. Abstr. Surg.*, July 1944, LXXIX, 32.)

185. "Pelvic actinomycosis treated by surgery and roentgen ray, with recovery." M. Rashbaum and H. C. McIntosh. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 849–54.

NEW GROWTHS OF THE REPRODUCTIVE ORGANS

186. "Rectal and colonic complications of pelvic irradiation." H. I. Kallet and M. J. Thorstad. *Surgery*, June 1944, XV, 980–7.

187. "The ureter and its involvement in pelvic irradiation." E. E. Mansur. *Radiology*, August 1944, XLIII, 147–54

188. "Benign and malignant testicular tubular adenoma in female (and existence of true ovotestis)." J. Novak. *Journ. Mt. Sinai Hosp.*, 1943, X, 250–68. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 472.)

189. "Tumores feminizantes e virilizantes das glândulas sexuais." (Feminizing and masculinizing tumours of the genital organs.) J. Horta. *Amatus Lusitanus*, April 1944, III, 187–210.

190. "Sarcoma botryoides." W. A. Dwyer. *Amer. Journ. Obstet. and Gynecol.*, July, 1944, XLVIII, 119–24.

191. "Cancer da glandula de Bartholin." (Cancer of the Bartholin gland.) A. Aguinaga. *Obstet. y Ginec. Latin-Amer.*, March 1944, II, 178–205.

192. "Cancer of the female urethra." W. G. Cuscaden. *Med. Journ. Austr.*, May 27th, 1944, I, 487–9.

193. "A simple office test for uterine cancer diagnosis." J. E. Ayre. *Canad. Med. Assoc. Journ.*, July 1944, LI, 17–25.

194. "Endocrine factors in the origin of tumors of the uterus." H. C. Taylor. *Surgery*, July 1944, XVI, 91–107.

195. "The management of uterine myomas. A study based on 1,000 consecutive personal cases and illustrating the technique of panhysterectomy." L. E. Phaneuf. *Surg., Gynecol. and Obstet.*, August 1944, LXXIX, 182–91.

196. "X-ray therapy of benign uterine bleeding and fibromyoma." S. J. Tamarkin. *Ohio State Journ. Med.*, November 1943, XXXIX, 1023–6. (*Radiology*, June 1944, XLII, 616.)

197. "Progesterone treatment of uterine and other abdominal fibroids induced in the guinea pig by α-oestradiol." A. Lipschütz and M. Maas. *Cancer Res.*, 1944, IV, 18–23. (*Brit. Chem. Physiol. Abstr.*, A III, August 1944, 542.)

198. "Microscopic structure of oestrogen-induced uterine and other abdominal fibroids treated with progesterone." A. Lipschütz and J. Schwartz. *Cancer Res.*, 1944, IV, 24–30. (*Brit. Chem. Physiol. Abstr.*, A III, August 1944, 542.)

199. "Incidence, treatment and prevention of hydatid mole and chorionepithelioma." E. M. Jeffreys and P. Graffagnino. *West. Journ. Surg.*, 1944, LII, 29. (*Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 139.)

200. "Quantitative pregnancy tests in (diagnosis of) hydatid mole and chorionepithelioma." R. T. Frank. *Journ. Mt. Sinai Hosp.*, 1943, X, 112–8. (*Brit. Chem. Physiol. Abstr.*, A III, July 1944, 470.)

201. "Prolapso do utero e cancer do colo." (Prolapse of the uterus and cancer of the cervix.) L. H. Dutrá. *Obstet. y Ginec. Latin-Amer.*, May 1944, II, 350–71.

202. "Diagnostico precoz de un epitelioma incipiente del ectocervix." (Early diagnosis of an incipient epithelioma of the lower cervix.) A. Roganti. *Obstet. y Ginec. Latin-Amer.*, May 1944, II, 379–83.

203. "The evolution of an improved transvaginal speculum (for the treatment of cancer of the cervix)." A. W. Erskine. *Radiology*, August 1944, XLIII, 170–4.

204. "Endometriosis and its serious complications." J. C. Masson and M. Cariker. *Proc. Inter-State Postgrad. Med. Assoc. N. Amer.*, 1943, 209–15: *Collected Papers of the Mayo Clinic*, 1943, XXXV, 288–9.

205. "Endometriosis interstitiale, with a report of three cases." J. R. Miller and R. Tennant. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 784–93.

206. "Ovarian tumors." J. C. Masson. *Univ. Toronto Med. Bull.*, April 1943, pp. 10: *Collected Papers of the Mayo Clinic*, 1943, XXXV, 246-54.

207. "Ovarian tumors with sex hormone function." E. Novak. *Surgery*, July 1944, XVI, 82–90.

208. "Embryonic carcinoma of ovary in a girl 13 years of age." S. Goldstein. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 129–32.

209. "The so-called Meig's syndrome" (letter). W. F. T. Haultain. *Brit. Med. Journ.*, August 5th, 1944, II, 192.

210. "Ovarian fibromas: a clinical and pathologic study of 283 cases." M. B. Dockerty and J. C. Masson. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 741–52.

211. "Torsion of ovarian cysts in children." R. E. Lesh. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 845–8.

212. "On the chemistry of ovarian cysts." R. M. Watts and F. L. Adair. *Amer. Journ. Obstet. and Gynecol.*, July 1944, XLVIII, 1–15.

213. "Thyroid tissue in ovarian dermoid." B. P. Tribedi and S. N. De. *Calcutta Med. Journ.*, February 1944, XLI, 31–3.

See also Ref. 63, 64.

OPERATIONS

214. "Vaginal hysterectomy: indications and a method." J. M. Waugh. *Journ. Indiana State Med. Assoc.*, October 1943, XXXVI, 537–40: *Collected Papers of the Mayo Clinic*, 1943, XXXV, 258–64.

215. "Disastrous sequelae to the Webster-Baldy operation." S. Pulrang. *Amer. Journ. Surg.*, August 1944, LXV, 281–5

216. "Transplantation of abdominal fascia for the relief of urinary stress incontinence." W. E. Studdiford. *Amer. Journ. Obstet. and Gynecol.*, June 1944, XLVII, 764–75.

217. "An operation for the cure of stress incontinence in the female." F. Macky. *Journ. Urology*, July 1944, LII, 27–35.

218. "Vesical and rectal incontinence in the same patient. Complete laceration of the perineum following childbirth and large vesicovaginal fistula following abdominal panhysterectomy." L. E. Phaneuf. *Amer. Journ. Obstet. and Gynecol.*, 1944, XLVII, 835–7.

See also Ref. 195.

MISCELLANEOUS

219. "Biological changes in squamous epithelium transplanted to the pelvic connective tissue." F. E. Whitacre and Y. Y. Wang. *Surg., Gynecol. Obstet.*, August 1944, LXXIX, 192–4.

220. "Oestrogens in dysuria and incontinence after the menopause." S. H. Geist and U. J. Salmon. *Journ. Mt. Sinai Hosp.*, 1943, X, 208–11. (*Brit. Chem. Physiol. Abstr.*, A III, August 1944, 538.)

221. "The influence of irradiation of the ovaries upon estrous and neoplastic development in Marsh-Buffalo mice." F. Bischoff, H. J. Ullman and L. P. Ingraham. *Radiology*, July 1944, XLIII, 55–8.

222. "Condyloma acuminata or genital warts in the female. Report of a case." H. Dover. *Canad. Med. Assoc. Journ.*, August 1944, LI, 132–4.

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